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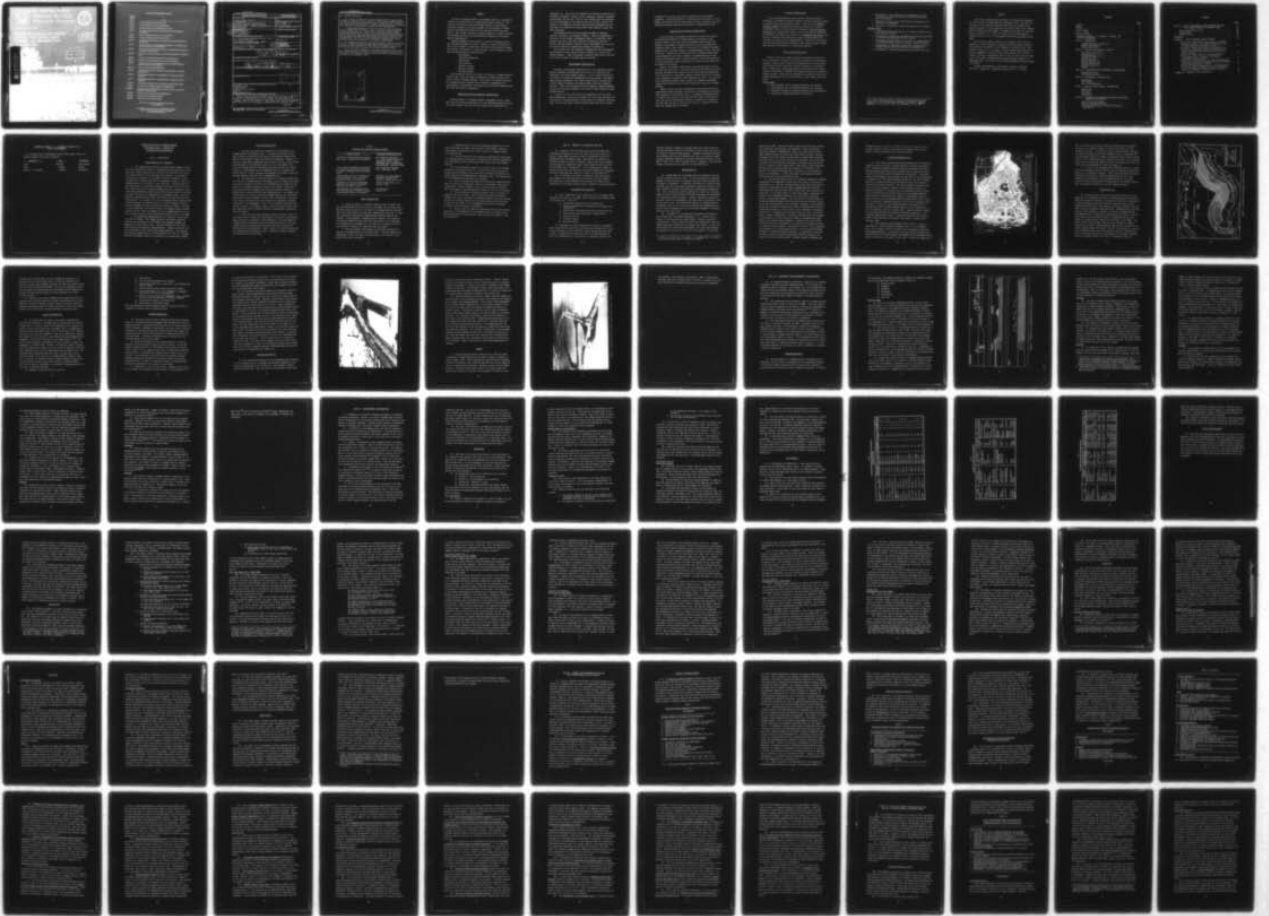
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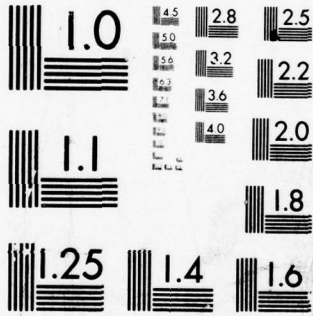
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# RESEARCH RESULTS DREDGED MATERIAL RESEARCH PROGRAM



Technical Report 79-7200

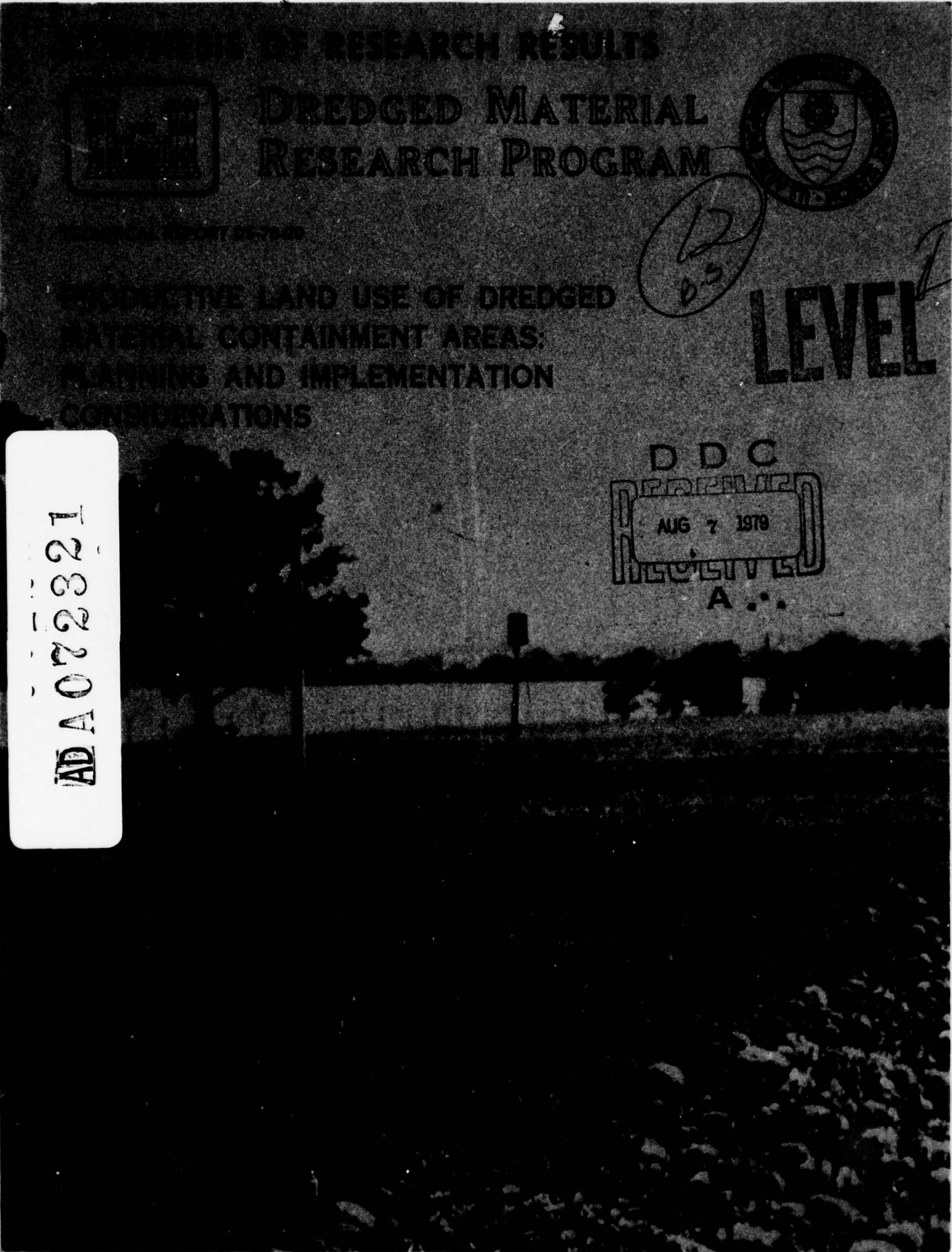
## PRODUCTIVE LAND USE OF DREDGED MATERIAL CONTAINMENT AREAS: PLANNING AND IMPLEMENTATION CONSIDERATIONS

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20. ABSTRACT (Continued).

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→ The creation of productive land with dredged material is particularly attractive, because this option provides for the disposal of dredged material and additional benefits can be realized from the new land itself. This concept requires the planner/engineer to combine confined land disposal practices with sound land use planning for successful project implementation.

To help planners/engineers deal with the productive land use alternatives, the DMRP sought to identify critical items that should be addressed during the planning process. These items are physical planning elements encompassing the physical features of potential containment areas that affect project feasibility, land use planning principles that should guide planners in both disposal and subsequent use planning, and finally an overall set of implementation factors that provide a framework for ensuring that project planners address all concerns that affect project implementation.

→ Also contained are guides on the legal framework in which the Corps must work for successful land use of dredged material containment areas and on a system for economic evaluation of land created from disposal areas so that ultimate land use might be included in the final economic evaluation.

Finally the report delineates and discusses seven policy and five planning issues that must be resolved at the Corps' policy and planning development level if the Corps is to assume a more active role in disposal-productive use planning for containment areas.

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## SUMMARY

The use of dredged material from navigable waters as a manageable resource is an alternative to conventional disposal practices. The creation of productive land with dredged material is particularly attractive, because this option provides for the disposal of dredged material and additional benefits can be realized from the new land itself. This concept requires the planner/engineer to combine confined land disposal practices with sound land-use planning for successful project implementation.

Numerous examples of the creation of land with dredged material are scattered throughout the world. Indeed, it would be difficult to find a major coastal or inland port that has not used material dredged from harbors or waterways to create new land. Seven categories of land uses are defined based on functional use:

- . Recreational
- . Industrial/commercial
- . Agricultural
- . Institutional
- . Material transfer
- . Waterway related
- . Multiple purpose

The existence of such a wide range of land uses of dredged material indicate that, under the right circumstances, dredged material can be used to create a valuable resource. The success of productive land-use as a dredged material disposal option depends on engineering and environmental, socioeconomic, and legal and institutional considerations and other site-specific constraints.

### Engineering and Environmental Considerations

The development of a dredged material containment area for subsequent land use requires consideration of the engineering aspects of both the active disposal operation and the eventual site preparation for

subsequent use. The process for disposal and subsequent productive use includes six elements: project survey, dredging, transport, placement, conditioning, and site use. Each of these elements must be undertaken with the requirements of the specific land use in mind. Much of the research in the DMRP was directed toward providing information on the best means to accomplish the tasks within these elements to meet disposal objectives.

Environmental effects can be grouped according to physical, chemical, biological, and aesthetic impacts. There is essentially no difference in the primary environmental impact of conventional land disposal and that of new land creation for productive land use. However, secondary impacts from the type of development that occurs on the created land may be significant and must be considered.

For the most part the discussion of engineering and environmental considerations in this report is only a checklist of items for the planner/engineer. Cross referencing to specific DMRP reports that deal with topics in depth is included wherever possible.

#### Socioeconomic Considerations

The major socioeconomic consideration for the productive land-use option is whether any additional cost is more than balanced by the additional social and economic benefits. To aid in the evaluation of the benefits, a land-value methodology has been prepared. The methodology provides estimates of the direct market value of created land, related community benefits, and adverse impacts from the productive land use. Using the methodology and sound judgment, planners/engineers can gain more accurate estimates of the value of land created by using dredged material.

A total of 15 case study sites were examined to test the land-value methodology. Overall, the increases in land value resulting from the addition of dredged material in open water or on marginal land were high, but the wide range of such increases showed that value increase

is largely site specific and does not correlate well with general parameters. Associated benefits of creating land are important. As an example recreational land in urban areas is scarce; therefore, such land created with dredged material could fulfill a pressing social need.

#### Legal and Institutional Considerations

On the one hand, environmental legislation dictates an increase in confined land disposal of dredged material resulting in land creation, while on the other, many environmental and land-use laws prohibit the placement of dredged material in sensitive aquatic and lacustrine areas. This conflict is the result of a highly fluid legal framework that constantly adjusts to changing Federal, State, and local objectives. Federal law has defined the basic framework within which planners/engineers must work to dispose of dredged material by both conventional methods as well as using innovative land creation options. The most significant Federal legislation and their areas of impact are discussed in this report.

However, the primary responsibility for land-use control lies at the State and local level. Since the creation of new land with dredged material ultimately will involve land use, State laws and regulations can be restrictive. Constraints imposed by State laws can be categorized as procedural, substantive, and categorical in nature. On the local level comprehensive master plans, zoning, and floodplain management programs must be dealt with to achieve productive land use of dredged material.

Federal, State, and local legislation and the many institutions administering these laws make it difficult to form general conclusions about legality of the land-use option. Although much legislation may be tested in the courts, it is clear that the trend to State control over land use and environmental quality is strong and is increasing. The Corps must be ready to work with the states to develop effective plans for dredged material disposal.

### Critical Planning Items

To help planners/engineers deal with the productive land-use alternative, the DMRP has sought to identify critical items that should be addressed during the planning process. These items are physical planning elements encompassing the physical features of potential containment areas that affect project feasibility, land use planning principles that should guide planners in both disposal and subsequent use planning, and finally an overall set of implementation factors that provide a framework for ensuring that project planners address all concerns that affect project implementation. When used in conjunction with the Corps multiobjective planning, these items can help to implement successful alternatives to conventional disposal.

### Policy and Planning Issues

Overall, there are a number of policy and planning issues that must be addressed to enhance the land-use alternative to conventional disposal. Some of these issues can be addressed by the Corps District and Division offices; others will require attention at the national level. These policy and planning issues were developed after examination of the myriad of problems that impede the wide use of productive land-use options. Until they are addressed the productive land use of dredged material will not be fully realized. These issues are listed below.

#### Policy issues

1. Corps advocacy role in disposal-productive use planning.
2. Corps advisory role in disposal-productive use planning.
3. Evaluation criteria for disposal-productive use alternatives.
4. Financing of disposal-productive use projects.

5. Application of the "Principles and Standards"\* and Corps multiobjective planning procedures to disposal-productive land use planning.
6. Expansion of Corps role in Corps-sponsor relationships for operations and management.
7. Legislative recognition of disposal-productive use concepts.

Planning issues

1. A multidisciplinary team approach to disposal planning by the Corps District offices.
2. Encourage more cooperative interagency/intergroup participation in planning disposal-productive use options.
3. Development and application of a holistic or systems approach to dredging-disposal-productive land use project planning.
4. Establishment of long-term, comprehensive regional plans for dredged material disposal-productive use alternatives.
5. Development of land-use planning expertise within the Corps.

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\*U. S. Water Resources Council, "Water and Related Land Resources; Establishment of Principles and Standards for Planning," Federal Register, Vol 38, No. 174, Part III, Washington, D. C., 1973.

## PREFACE

This report provides general guidance for planning and implementing the land use of dredged material containment areas. The basis for the report is the research conducted within Task 5D, "Disposal Area Land Use Concepts," of the Productive Uses Project (PUP) of the Dredged Material Research Program (DMRP). The DMRP was sponsored by the Office, Chief of Engineers, U. S. Army, and conducted by the Environmental Laboratory (EL) of the U. S. Army Engineer Waterways Experiment Station (WES).

Mr. Michael R. Walsh, Research Civil Engineer, and MAJ Mark D. Malkasian, CE, R&D Coordinator, prepared this report under the general supervision of Mr. Thomas R. Patin, Manager of the PUP, and Dr. John Harrison, Chief of EL. Dr. Roger T. Saucier and MAJ Robert Meccia, CE, were also Managers of the PUP during various stages of the research program. Extensive supplemental input to Parts VI and VII was provided by Mr. John Gushue, Program Manager, Energy Resources Company, Inc., Cambridge, Mass. This report is also being published as Engineer Manual 1110-2-5022.

During the preparation of this report, Director of WES was COL John L. Cannon, CE. Technical Director was Mr. F. R. Brown.

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**CONVERSION FACTORS, U. S. CUSTOMARY TO METRIC (SI)  
UNITS OF MEASUREMENT**

U. S. customary units of measurement used in this report can be converted to metric (SI) units as follows:

<u>Multiply</u>	<u>By</u>	<u>To Obtain</u>
acres	4046.873	cubic metres
feet	0.3048	metres
miles (U. S. statute)	1.609344	kilometres

PRODUCTIVE LAND USE OF DREDGED MATERIAL  
CONTAINMENT AREAS: PLANNING AND  
IMPLEMENTATION CONSIDERATIONS

PART I: INTRODUCTION

Dredged Material as a Resource

1. The Dredged Material Research Program (DMRP) sought to determine the environmental impacts of dredged material disposal and, at the same time, develop alternatives to increase the beneficial and reduce the adverse effects of both land and water disposal. An attractive alternative, one explicit in the DMRP's objective statement, is the consideration of dredged material as a manageable resource. The use of dredged material as a resource is not a new idea. Rising interest in this alternative to conventional disposal practices is due to the fact that, while the amount of material dredged each year continues to rise, increasing urbanization around waterways and ports has made it difficult to locate new sites for dredged material containment areas. New environmental regulations have further restricted both land and water disposal options. As a result, the costs of dredged material disposal have increased rapidly as disposal sites are located at greater distances from the dredging site and environmental controls are added. In light of these conditions, the resource recovery of dredged material becomes a viable option. Thus, the beneficial use of dredged material was the major research thrust of the Productive Uses Project (PUP) of the DMRP.

2. By considering dredged material as a resource, a dual objective can be achieved. The dredged material from needed navigation projects can be disposed of with minimal environmental damage, and benefits can accrue from its use. One major beneficial use results from creating new land with dredged material. Almost any type of land use is possible on land created from dredged material. The Disposal Area Land Use (DALU) task of the PUP addressed the land use of dredged material containment areas as an alternative to conventional disposal.

### Disposal Area Land Use

3. The DALU task dealt with concepts for the ultimate use of dredged material containment areas. It would be very hard to find a major coastal or inland port that has not used material dredged from harbors or waterways to create new land for development. However, in most past cases where dredged material has been confined, little thought has been given to the subsequent land use of the containment area. Often the dredged material containment area has been left as a wasted resource, or development has been haphazard and out of harmony with nearby land use. Proper planning and management are needed to gain the greatest benefits from this use of dredged material.

4. The objectives of the DALU task were to identify concepts for the land use of dredged material containment areas and assess the incentives and constraints associated with implementing the concepts in the context of a dredging operation. Early in the conduct of the task it was discovered that, although there were many workable concepts, a complex web of factors affected their implementation. For example, the recreational use of land created from dredged material was a desirable alternative, but the economic, social, legal, institutional, and technical issues associated with such a project were sometimes formidable roadblocks to its development. Also, it was recognized that often the "softer" issues, i.e. economic, legal, social, and institutional, were more important than the technical issues in implementing a productive land use project.

5. Thus, while the task examined concepts, the major thrust of the research was to assess the socioeconomic, technical, institutional, legal, and policy incentives to and constraints on the development of dredged material containment areas for subsequent land use. The five research studies conducted under the DALU task each contributed to fulfilling the task objectives. Table 1 lists the research studies and the organizations performing the work. Appendix A contains abstracts from the reports for each study.

Table 1  
Disposal Area Land Use Research Studies

<u>Research Study</u>	<u>Performing Organization(s)</u>
Land Use of Dredged Material Containment Areas: Productive Use Examples <sup>1</sup>	Environmental Laboratory, U. S. Army Engineer Waterways Experiment Station (WES), Vicksburg, Miss., and Beeman and Benkendorf, Portland, Oreg.
Case Studies and Comparative Analyses of Issues Associated with Productive Land Use at Dredged Material Disposal Sites <sup>2</sup>	Energy Resources Company, Inc., Cambridge, Mass.
Socioeconomic Aspects of Dredged Ma- terial Disposal: The Creation of Recreation Land in Urban Areas <sup>3</sup>	Department of Environmental Sciences, University of Virginia, Charlottesville, Va.
Evaluation of Laws and Regulations Impacting the Land Use of Dredged Material Containment Areas <sup>4</sup>	Science Applications, Inc., LaJolla, Calif.
A Methodology for Determining Land Value and Associated Benefits Created from Dredged Material Containment <sup>5</sup>	SCS Engineers, Reston, Va.

Report Organization

6. Using the results of research conducted under the DALU task and selected studies from other parts of the DMRP, this synthesis report describes usable concepts for the land use of dredged material containment areas and discusses the important considerations that must be taken into account when planning and implementing disposal-productive use concepts. Corps personnel, dredging project sponsors, local agencies, and affected communities will find this report useful as a compendium of information on the complex set of factors that can affect the ultimate success or failure of a productive land use project.

7. Part II provides a description of functional categories of land use of dredged material containment areas. Selected examples are highlighted to give the reader an appreciation of the variety of productive land uses in existence.

8. Beginning with Part III and continuing through Part VI, the report discusses the legal, institutional, socioeconomic, technical, and planning considerations that affect land use of dredged material containment areas.

9. Part III deals with the technical considerations, describing the dredging-disposal system and its components and then the engineering and environmental factors associated with creating land from dredged material.

10. The socioeconomic aspects of productive land use of dredged material are discussed in Part IV. A brief description is given of a methodology for determining the land value and associated benefits and adverse impacts of dredged material containment areas. The implications of this methodology for planners are discussed.

11. Part V discusses the legal and institutional framework within which all work on the productive land use of containment areas must be accomplished. Relevant Federal, state, and local laws are examined, and an assessment of the implications of trends in the law is furnished.

12. Proper planning of disposal-productive land use projects is essential for their success. Part VI identifies physical planning elements that must be addressed in disposal-productive land use planning and land use planning principles for guiding subsequent use decisions. In addition, an overall set of implementation factors for disposal-productive land use projects is presented.

13. Finally, Part VII examines planning and policy issues affecting land use of dredged material containment areas and suggests areas where modification to present policy might enhance the productive land use alternative.

## PART II: CONCEPTS FOR PRODUCTIVE LAND USE

14. A search of the literature and contacts worldwide with individuals and agencies in both the public and private sectors revealed a large number and great variety of productive land uses of dredged material containment areas. Essentially, the spectrum of innovative productive uses is unlimited. Many of the better examples are described in a companion report,<sup>1</sup> while numerous others are compiled in DMRP reports elsewhere.<sup>5-7</sup> Also, detailed case studies of productive land uses were developed to provide insight into the issues and factors governing the success or failure of such ventures.<sup>2,5</sup>

15. To introduce the reader to productive land use concepts, some examples are reviewed herein by functional land use category. The discussion of these examples should provide the reader with an appreciation of the many possible types of productive land use projects.

### Functional Use Categories

16. After examination of the productive land use examples found throughout the conduct of the DMRP, seven categories were defined based on functional use. These are:

- a. Recreational (commercial and noncommercial).
- b. Industrial/commercial (including port development and residential).
- c. Agricultural (including horticulture and mariculture).
- d. Institutional (including public transportation).
- e. Material transfer.
- f. Waterway-related.
- g. Multiple-purpose.

17. Throughout the survey<sup>1</sup> emphasis was placed on containment areas filled with silt and finer grained material because their use is limited compared to sites filled with coarser grained materials such as sand. Documentation of productive uses of dredged material for other than landfill led to the inclusion of "material transfer" and

"waterway-related" categories, although these uses could be more accurately described as those of the material itself rather than uses of the landfill created through disposal. Examples of wildlife and fisheries habitat land use were excluded since they are relatively common and were addressed elsewhere by the Habitat Development Project of the DMRP.<sup>6</sup> Each of the seven functional land use categories, with relevant examples extracted from the survey,<sup>1</sup> is described below.

#### Recreational Use

18. Recreational use of dredged material containment areas was the most prevalent land use cited. It is not surprising to find many examples of such use since it requires relatively little planning and investment to accomplish. In addition, the nature of recreation sites with much open space and light structures is especially suited to the weak foundation conditions associated with fine-grained dredged material. Also, recreational land is generally for public use, and high demand for public water-oriented recreation encourages the development of recreational land use projects. Finally, legislation relating to wetlands, coastal zone management, and flood control is biased in favor of this type of use. The recreational land use of dredged material containment areas is one of the more promising and implementable productive uses of dredged material but is heavily dependent on financial backing at the local level.

19. An example of a noncommercial recreational development is East Potomac Park in southwest Washington, D. C., astride the confluence of the Anacostia and Potomac Rivers. Disposal operations completed here in 1912 created 329 acres\* from fine-grained clays and organic materials dredged from the Potomac main channel. By 1925 the park reached full recreational development, and since 1939 ownership and operation of the facility have been in the hands of the National

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\* A table of factors for converting U. S. customary units of measurement to metric (SI) units is presented on page 11.

Park Service (NPS). The site currently offers four 9-hole golf courses and a snack bar, driving range, and clubhouse. Other recreational facilities include a swimming pool, indoor and outdoor tennis courts, eight baseball fields, and fields for field hockey, football, and polo. Buildings on the site include the NPS offices, a maintenance building, a comfort station, and several other minor structures. Use of the park open space for recreation has increased to the extent that the conversion of a portion of golf course land to open space is being considered. The park serves a regional need for recreation of residents of the District of Columbia, Arlington County, and the City of Alexandria as well as area commuters. In 1975, the Corps' North Atlantic Division placed the value of the park at \$94 million.

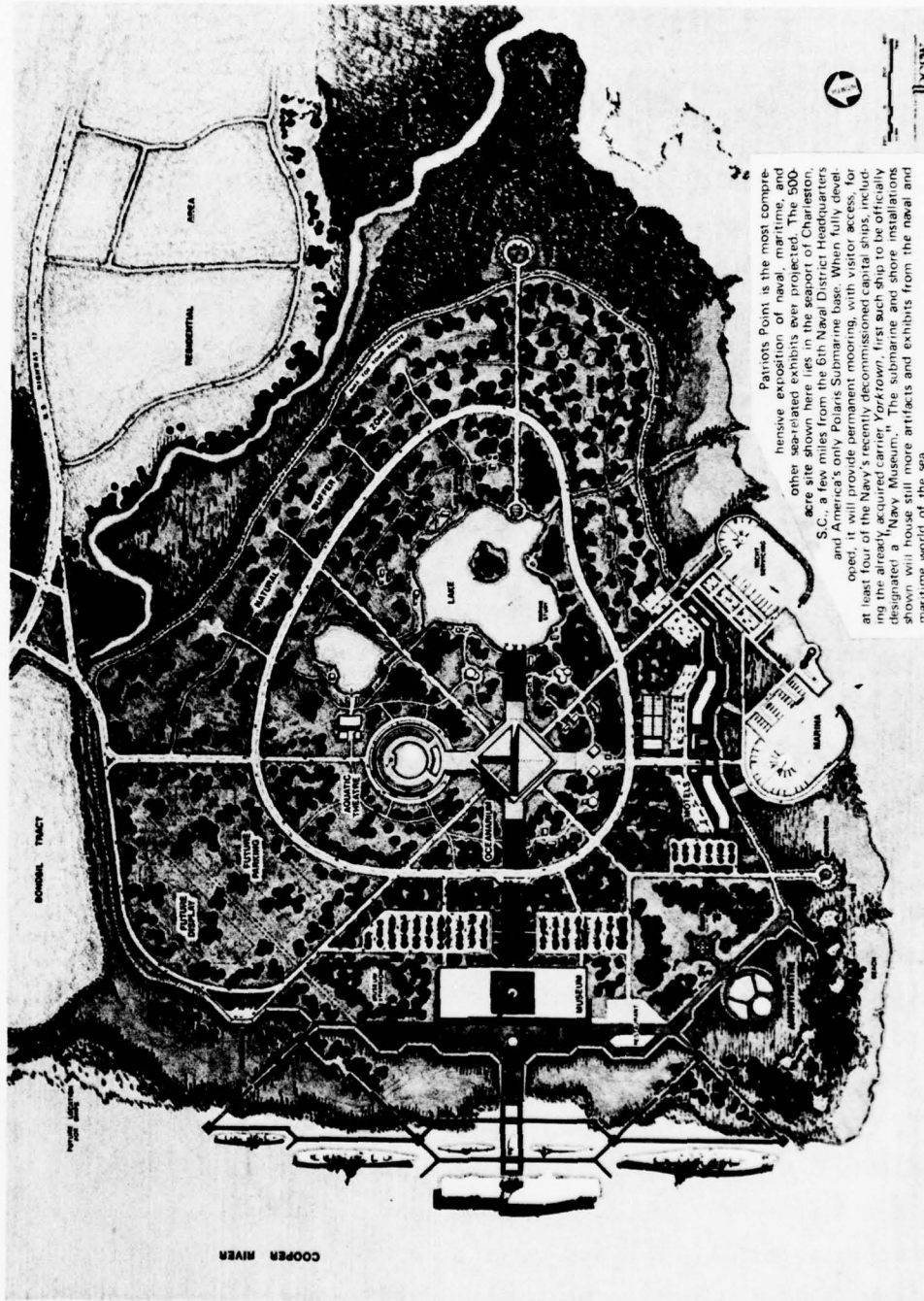
20. The Patriots Point Project is a 450-acre commercially oriented recreational site immediately across the Cooper River, 1 mile east of Charleston, S. C. The site, formerly known as Hog Island, was used for disposal of maintenance and new channel dredged material--primarily mixed sandy silt and clay--from 1956 to 1970; dikes were constructed of heavy clay. In the early 1970's, a quasi-state agency, designated the Patriots Point Development Authority, was established to plan and develop a recreational complex. The focal point of the development is a Naval and Maritime Museum with the aircraft carrier Yorktown, moored at the site in early 1976, as the principal attraction. The Authority's master plan includes an 18-hole golf course, a 150-room motor inn with convention facilities, a 375-slip marina, and a 300-space recreational vehicle park. Long-range plans include construction of an oceanarium, aquatic theatre, amphitheatre, restaurant, man-made lakes, and a permanent mooring for at least three more classes of decommissioned naval ships as the vessels become available. A dike-top tour route around the site will also be constructed. The project will ultimately attract 1.5 million visitors annually. Structures at the site will be supported on pilings due to the compressible nature of the fine-grained dredged sediments and underlying organic material. An overburden of sand will be added to provide suitable drainage and foundation conditions for light structures and parking areas. Topsoil, possibly including some

dredged material, will also be placed in portions of the site to encourage vegetative growth, particularly in designated buffer zones. Figure 1 depicts the master plan for Patriots Point.

#### Industrial/Commercial Use

21. The economic potential and social productivity of industrial/commercial activity provide a strong incentive for growth and development. Industrial/commercial activity has most noticeably flourished astride natural harbors and along waterways where raw materials can be received and finished products shipped most economically. Industrial/commercial development near waterways has been aided by the availability of hydraulic fill from nearby dredging activities. The use of dredged material to expand or enhance port-related facilities has generally received local support because of the readily apparent potential benefits to the local economy. Approval of the disposal operation is generally predicated on advancing the port development project and not on the incidental need for proper disposal of the dredged sediments. Traditionally, where disposal will advance the development goal, attempts are made to use the dredged material productively; where it will not, the material is generally disposed of by the most economical means available. The key for the disposal-productive use planner is to identify how, when, and where dredged material from a navigation project can fulfill a social or economic need. Identification of economic or social benefits may help overcome environmental opposition. Job-producing planned uses in areas of depressed employment are much more likely to gain approval than projects that appear to conflict with community needs.

22. The Presidents Island-Memphis Harbor Project is located approximately 5 miles southwest of Memphis, Tenn. It is a 960-acre site on the southeast side of the island (now a peninsula) filled with sandy dredged material. A slack-water area was created by diking, and an 800-ft-wide by 12-ft-deep channel was dredged and the sediments placed along 3-1/2 miles of the channel's north bank. Filling was completed in



Patriots Point is the most comprehensive exposition of naval, maritime, and other sea-related exhibits ever projected. The 500-acre site shown here is the largest of Charleston, S.C., a few miles from the airport of Charleston, and a few miles from the city of Charleston. It is the site of the Navy's Submarine base. When fully developed, it will provide permanent mooring, with visitor access, for at least four of the Navy's recently decommissioned capital ships, including the already acquired carrier *Yorktown*, first such ship to be officially designated a "Navy Museum." The submarine and shore installations shown will house still more artifacts and exhibits from the naval and maritime world of the sea.

Figure 1. Master plan of Patriots Point Naval and Maritime Museum, Charleston, S. C. (from Conrad and Pack5)

1957, and within 20 years most industrial development was completed. By 1973 over 70 separate industrial concerns had bought or leased acreage on the site. A feasibility study of proposed harbor expansion alternatives prepared by the Corps' Memphis District recommended that a second harbor channel be dredged at Presidents Island and the material placed on the island along the new channel's south bank. This proposal would create an additional 1000 acres above the floodplain for port and related industrial/commercial facilities (Figure 2).

23. In spite of the sometimes poor foundation qualities, dredged material containment areas have become sites of multiple-building high- and low-rise residential complexes. Since this investigation excluded residential development on selected dredged material (i.e. sand), examples are limited where finer grained material has been used. Success has been attained where the properties of the dredged material have been properly accounted for in the residential design.

#### Agricultural Use

24. In recent years, there has been extensive interest in the potential for increasing crop yields by amending marginal agricultural lands with organic-rich wastes. Increased soil fertility is manifested in improved organic content and moisture retention capacity and in textural characteristics, clay mineral distribution, aeration, pH, and other chemical and physical characteristics. Dredged material has been used as a soil amendment in the past, and inactive dredged material containment areas are being used as agricultural land today. A greenhouse study on the agricultural value of dredged material was conducted by the Agricultural Research Service (ARS) for the DMRP.<sup>7</sup> The study results indicated that, under the right conditions, dredged material can be used to improve marginal agricultural land and can, by itself, support forage crop growth. However, the potential for success using dredged material is not only based on technical considerations such as the nature and extent of impermeable soils and their susceptibility to pollutant uptake, but also to a substantial degree on

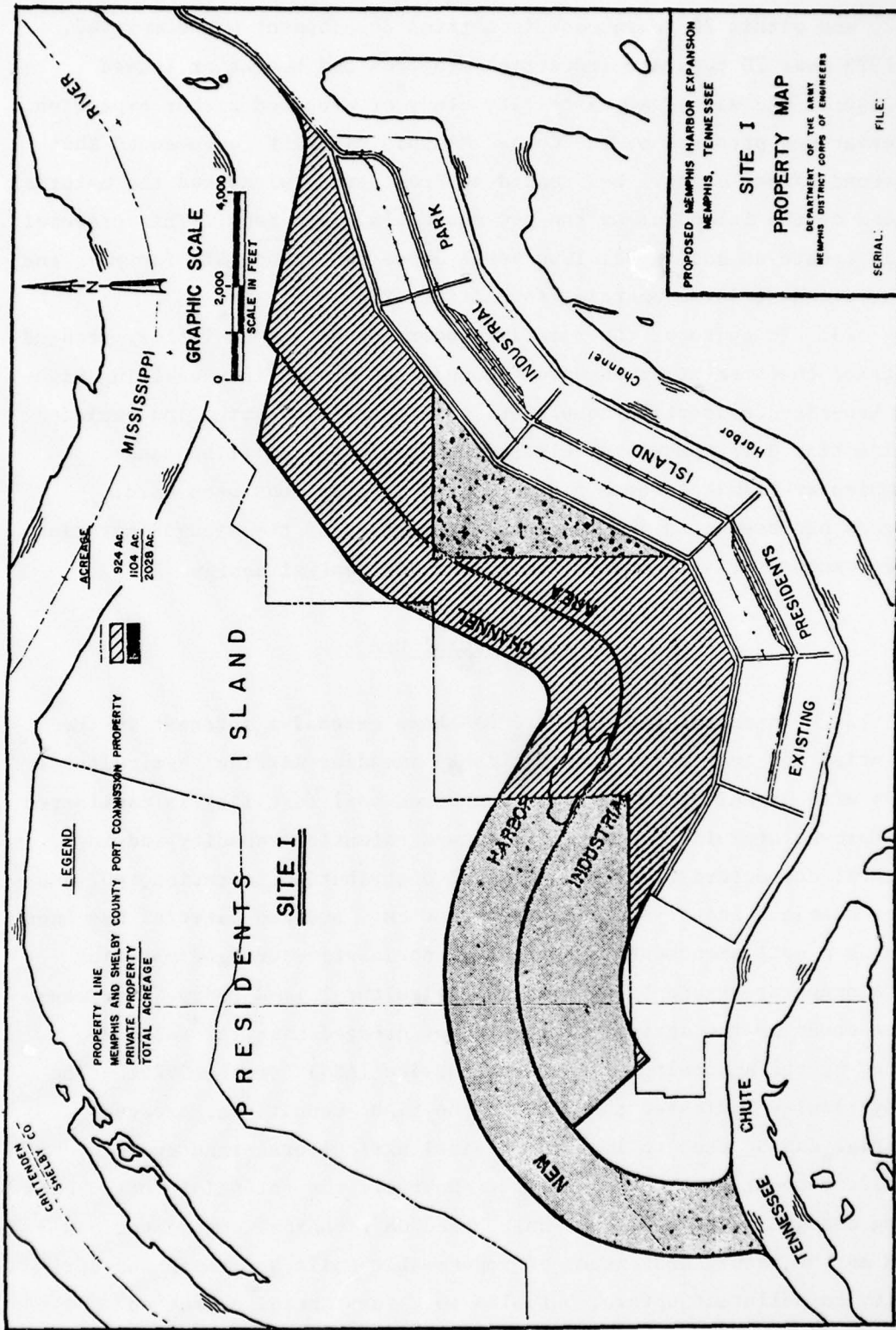


Figure 2. Presidents Island-Memphis Harbor Project

regional economic conditions and trends.

25. One DMRP study related to this point examined the feasibility of using dredged material containment areas to grow lawn sod or horticultural crops.<sup>8</sup> There were no technical problems that could not be overcome; however, the market conditions governing the sale of lawn sod and horticultural crops limited the opportunity for the application of the concept. Specific market studies dealing with economic feasibility are necessary before instituting agricultural land use concepts.

26. One site currently in agricultural production was identified in South Carolina. The Old Daniel Island Disposal Area in Berkeley County was used for maintenance dredging in Charleston Harbor from 1953 until 1968. Dikes were constructed of heavy clay; material deposited was silts and fines. The Guggenheim Foundation has truck farmed 450 to 500 acres of the 700-acre site for the last 6 to 8 years. Almost all native crops have been grown successfully, with corn and soybeans showing the best yields. In 1977, all acreage was devoted to these two crops with the exception of 15 acres being tested for wheat production. No special crop management techniques have proven necessary. Crops are marketed locally with no indication as to their source; no adverse public opinion has been heard. A second disposal site on the island, initiated in 1968, is nearly filled to capacity and upon filling will be turned over to the Guggenheim Foundation to expand its farming operations.

27. The Tulsa District since 1973 has been leasing dredged material disposal sites along the Arkansas and Verdigris Rivers to adjacent property owners for use as grazing land. Presently, the District has 2600 acres under grazing leases. Natural colonization has provided suitable grassy vegetation for feeding. Lessees have not honored their agreements in that they have allowed cattle to roam on the slopes of the disposal berms along the edges of the rivers. An erosion problem has resulted, so the Corps is in the process of terminating the leases by attrition. Future plans are to artificially propagate the disposal lands where needed to produce a green strip area along the rivers where wildlife habitat and sport fishing uses would be encouraged. Despite the erosion problems, grazing projects on other dredged material

disposal sites have been successful.

28. Under the Products Development portion of the Productive Uses Project, the mariculture of shrimp in a conventional disposal site was a field tested DMRP concept with apparent potential for at least regional application.<sup>9,10</sup> In a 20-acre portion of an active 158-acre containment area, approximately 700,000 juvenile brown shrimp, sustained exclusively on the nutrient value of dredged sediments from the Gulf Intracoastal Waterway in West Galveston Bay, were grown to a marketable size in about 3 months. Excellent growth and survival rates were noted, and chemical evaluation resulted in an issuance of a National Marine Fisheries certificate of wholesomeness for human consumption. The shrimp were successfully test marketed through wholesale and retail food and bait outlets. In this and similar instances, the advantage to the Corps is that a landowner is more likely to favorably consider the use of his land as a disposal site if he can derive some benefit from it rather than relegate it solely to a form of waste disposal. In mariculture, the disposal site forms the required impoundment and the organic-rich dredged material is a periodically renewed source of food for the organisms.

#### Institutional Use

29. The institutional category includes all public service/municipal uses of dredged material containment areas such as electric utilities, transportation systems, and water and wastewater facilities.

30. Pleasure Island, bordering the Intracoastal Waterway near Port Arthur, Tex., is a 3500-acre land area formed from over 50 years of silt and sand disposal. A rock dike protects a small portion of the island that is presently developed. Among the diverse facilities developed thereon are a university campus (Lamar University), an Army Reserve Training Center, and a Corps Area Office. Two recently constructed rock dikes will encourage further institutional facilities including an already planned sewage treatment plant.

31. In Salem County, N. J., a 1967 land swap negotiated between

the Corps and the local public utility company has resulted in the construction of a nuclear power plant on a 200-acre disposal site. The first of four units commenced operation in 1976; the remaining units will be on-line by 1979 and mid-1980. The site was originally a sandbar upon which fine-grained material from Delaware River dredging over the past 70 years had been placed to form a peninsula--now called Artificial Island.

32. There are some limited examples where dredged material containment areas have been converted to public transportation facilities. Small boat and ferry landings, airport runways and runway extensions, taxiways, and parking areas are typical facilities cited in the survey. Aircraft use of such sites is usually limited to light aircraft.

#### Material Transfer Use

33. In recent years the reuse or recycling of materials has received great attention. The DMRP looked at productive uses from two perspectives: (a) that of reuse of the dredged material disposal site itself, and (b) that in which the containment area is a rehandling or processing basin from which some or all of the material can be removed and put to productive use elsewhere. This latter perspective, whereby the disposal life of the site is significantly extended through proper management, is dealt with in depth in other DMRP reports.<sup>11,12</sup> The latter report describes a methodology for site selection, design, and management of reusable sites. However, the material transfer category here only indicates the range of uses for which the material itself has been transferred away from the dredged material containment area. The following list encompasses material transfer concepts that are not strictly related to the land use of dredged material disposal sites. But it does help to consolidate under a single heading the known spectrum of material transfer opportunities where a confined disposal facility was used for rehandling or processing of dredged material for use, sale, or donation elsewhere.

34. Examples of material transfer uses are:

- a. Road sanding.
- b. Fill for road embankments and causeways.
- c. Nonstructural portions of road fills, e.g., medians and toes of slopes.
- d. Erosion control along roads and aircraft runways.
- e. Soil conditioning, e.g., soil amendment for marginal agricultural land and in home gardens.
- f. Multiple uses in solid waste management, e.g., as liner, cover, and venting material in sanitary landfills.
- g. Stockpiling for public and private use.
- h. Reclamation of strip-mined lands.

The land improvement concept synthesis report<sup>13</sup> contains detailed information on material uses of dredged material.

#### Waterway-Related Use

35. Consistent with the Corps' planning and execution responsibility for navigable waterway development and maintenance are uses of dredged material for waterway-related purposes such as shore protection, beach nourishment, breakwater construction, and river control structure construction. Waterway-related uses normally involve the creation of landforms and thus provide opportunities for imaginative multiple-use site development. Secondary recreational uses in conjunction with waterway-related uses are most common.

36. Method and sequence of the dredging operation as well as disposal site layout greatly influence project success. In most instances, dredged material of a sufficiently high quality is incorporated to allow it to be pumped in place and to provide some structural characteristics to withstand the eroding forces of waves, wind, and currents. The citations in the survey<sup>1</sup> are not instances in which selected material was dredged for the express purpose of creating a landform; rather, the need to accomplish a specific dredging project provided the opportunity for a productive use option.

37. Examination of past projects shows a tendency toward repetition of square and rectangular disposal areas or the squaring off of

an existing indentation in the shoreline. This is done since economics often necessitate minimizing diking costs and maximizing site capacity by filling to the property boundaries. Where these conventional shapes have been abandoned and unique landforms have been attempted, opportunities for new uses have been created.

38. For instance, along the Columbia River navigation channel at Kalama, Wash., sandy dredged material has historically been pumped along the shoreline to constrict the river, protect the banks, and provide informal recreation areas. Hydraulic model studies of the Kalama area indicated that channel maintenance dredging could be reduced by a substantial reduction in the width of the river. Under conventional practices, this would have been accomplished by placing permeable groins at right angles to the river and pumping dredged material between the groins. It was recognized that the same objective could be accomplished by placing the sand in the shape of an "L" with the short leg at right angles to the shoreline and the long leg heading downstream, parallel to the existing beach. The land thus created would have water on all sides, but, more importantly, the 10-acre water area between the "L" and the existing beach would provide a harbor for launching and mooring small craft. This water area would be protected from river currents, wind, waves, and wakes from passing deeper draft vessels. A park has been constructed at the upstream end of the fill and a launching ramp at the outer end of the "L." Initial construction of a marina was completed in 1977. The costs of the dredging and river control structures were comparable to those of a conventional design with the added benefit of the local community gaining a ready-made small boat harbor essentially at no additional cost (Figure 3).

#### Multiple-Purpose Use

39. The conventional approach to site development and subsequent use of a disposal area is to consider the material dredged as a constraint on development or use of the site. For instance, disposal areas filled with silt, clay, and fines can be expected to offer poor



Figure 3. Recreation site on Columbia River at Kalama, Wash.

foundation conditions and have settlement problems. However, several projects were identified where careful planning and material placement enabled the developer to overcome the inherent problems of the dredged sediments or the site. The following example demonstrates what can be accomplished when poor-grade dredged materials are placed in conjunction with higher quality materials to produce a more usable site.

40. Along the shoreline in Toronto, Canada, numerous commercial, transportation, and recreational sites have been created by the combined use of landfill and dredged material. Aquatic Park, under development by the Toronto Harbour Commissioners, is an excellent example of how the form of the land created can enhance the number and quality of productive uses. Construction rubble was used to create an approximately 3-mile-long headland running at an oblique angle to the natural shoreline. The headland is essentially linear but has numerous indentations in its shoreline dike. Dredged material was placed in the water behind the rubble dike where protection is afforded from wave and tidal action and associated erosion. The dredged material was placed to form contours for the development of lagoons and lakes along and behind the shoreline. The resultant configuration of the headland resembles natural landforms in the area. The length of shoreline is many times the length that would have resulted from a conventionally shaped disposal area; thus, opportunity for shoreline utilization has been increased. Figure 4 shows Aquatic Park during dredged material placement.

#### Summary

41. The preceding discussion indicates that, under the right circumstances, dredged material can be used to create a valuable resource; namely, land. Proper planning and coordination with dredging schedules is necessary, but a positive approach and a little ingenuity can go a long way toward achieving a productive land use with dredged material. The rest of this report focuses on the many issues and factors that enhance or constrain the development of productive land

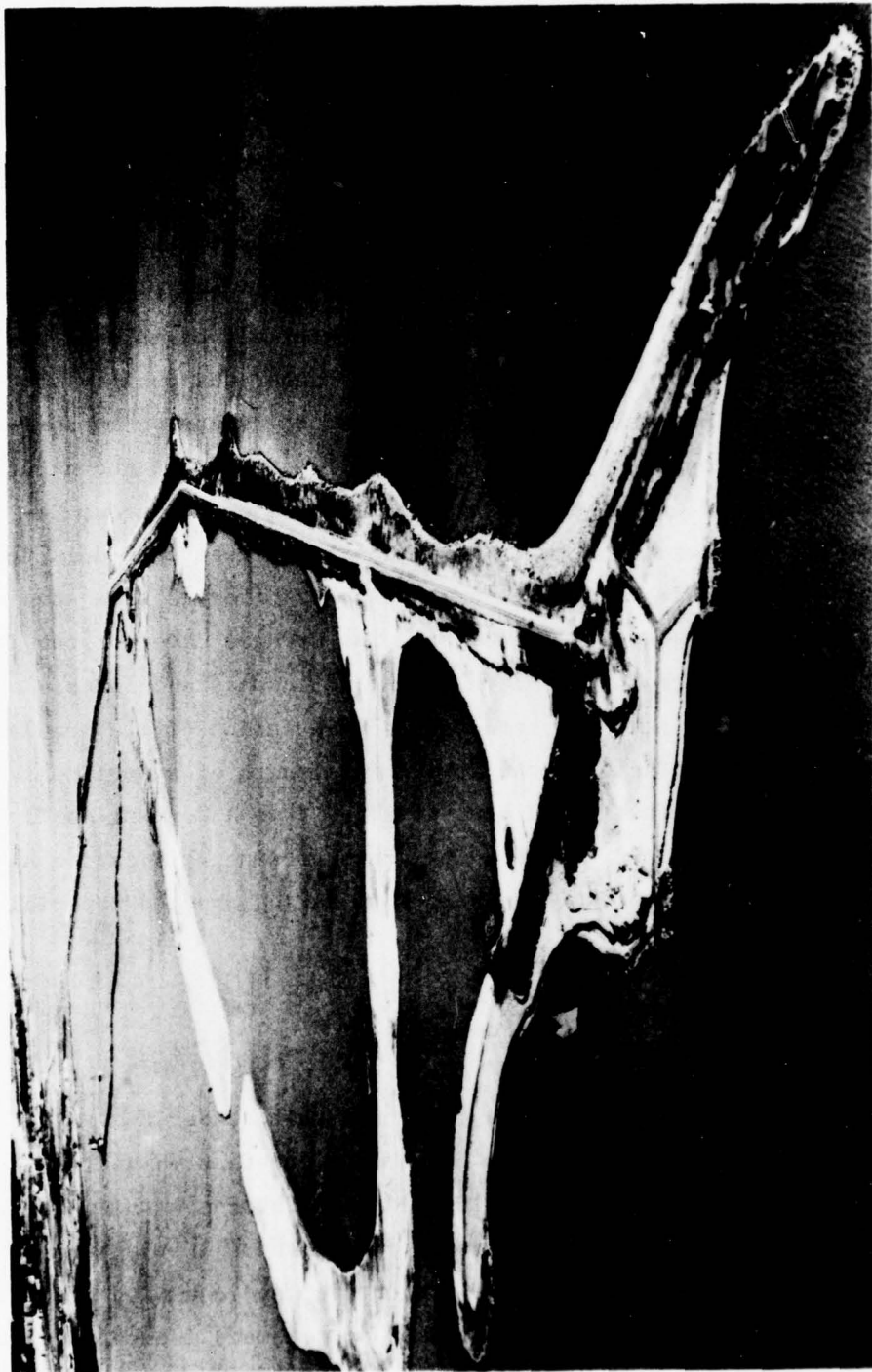


Figure 4. Dredged material placement, Aquatic Park, Toronto, Canada

use concepts. The technical, socioeconomic, legal, institutional, planning, and policy considerations of interest to planners and engineers involved with disposal-alternative use plans are delineated.

### PART III: ENGINEERING AND ENVIRONMENTAL CONSIDERATIONS

42. The engineer/planner is faced with a complex set of technical problems in creating land with dredged material. Not only must the engineering aspects relating to site design, size, and configuration be solved, but the environmental impacts of the disposal operation and the fast land created must be predicted and assessed for their importance to the ecosystem and adverse impacts prevented or mitigated wherever possible.

43. The engineering and environmental aspects of dredged material disposal were major topics of concern in the DMRP. Practical information and usable techniques for the design, operation, and management of dredged material containment areas were developed.<sup>14-17</sup> While the emphasis on different engineering techniques may vary depending on the ultimate use of the site, the same methods are applicable to conventional as well as productive use disposal alternatives.

44. The environmental impacts of dredged material disposal were the subject of studies throughout the DMRP. Thorough analysis of the type, amount, and extent of environmental problems associated with dredged material disposal can be found in various reports.<sup>18,19</sup> Thus, for an in-depth treatment of the engineering and environmental aspects of various modes of dredged material disposal, the reader should refer to the appropriate report or reports. The following discussion reviews only those engineering and environmental considerations that are important with respect to disposal-productive land use projects. It is not an in-depth analysis of each aspect but rather a framework or checklist of items of importance.

#### Engineering Aspects

45. The development of a dredged material containment area for subsequent land use requires consideration of the engineering aspects of the active disposal operation and the eventual site preparation associated with construction in weak foundation conditions. To clarify

the discussion, the planning process for disposal and subsequent productive use is broken down into six elements (Figure 5):

- a. Project survey.
- b. Dredging.
- c. Transport.
- d. Placement.
- e. Conditioning
- f. Site use.

#### Project survey

46. Prior to the actual dredging operation, a project survey should be made to, at a minimum, determine the quantity and characteristics of the material to be dredged and evaluate candidate disposal sites. The quantity of material to be dredged determines the extent and elevation of the proposed disposal site or the degree of completion of the site for the present dredging cycle. Careful consideration must be given to the in situ volume of the material versus the volume in the containment area. Detailed methods for determining the final volume of dredged material placed in a containment area are given elsewhere.<sup>14</sup>

47. The characteristics of the dredged material are important in that the clay-silt-sand content, water content, and other soil parameters determine the engineering strength of the dredged material and the suitability of the created land for various types of development. Bartos<sup>20</sup> has shown that dredged material is simply soil with a high water content that can be classified according to accepted soil classification systems. Proper soil classification can help define the feasible set of alternatives for productive land use. A knowledge of the soil characteristics of the dredged material will allow the planner/engineer to limit his range of land use alternatives or incorporate features into the design to offset material deficiencies.

48. Proper site selection is basic to dredged material disposal and can be assured only if it is based on a rational planning process. Potentially, environmental, operational, social, institutional, and legal problems can arise if dredged material is disposed of at an improperly situated site. Dredging project sponsors who must provide a

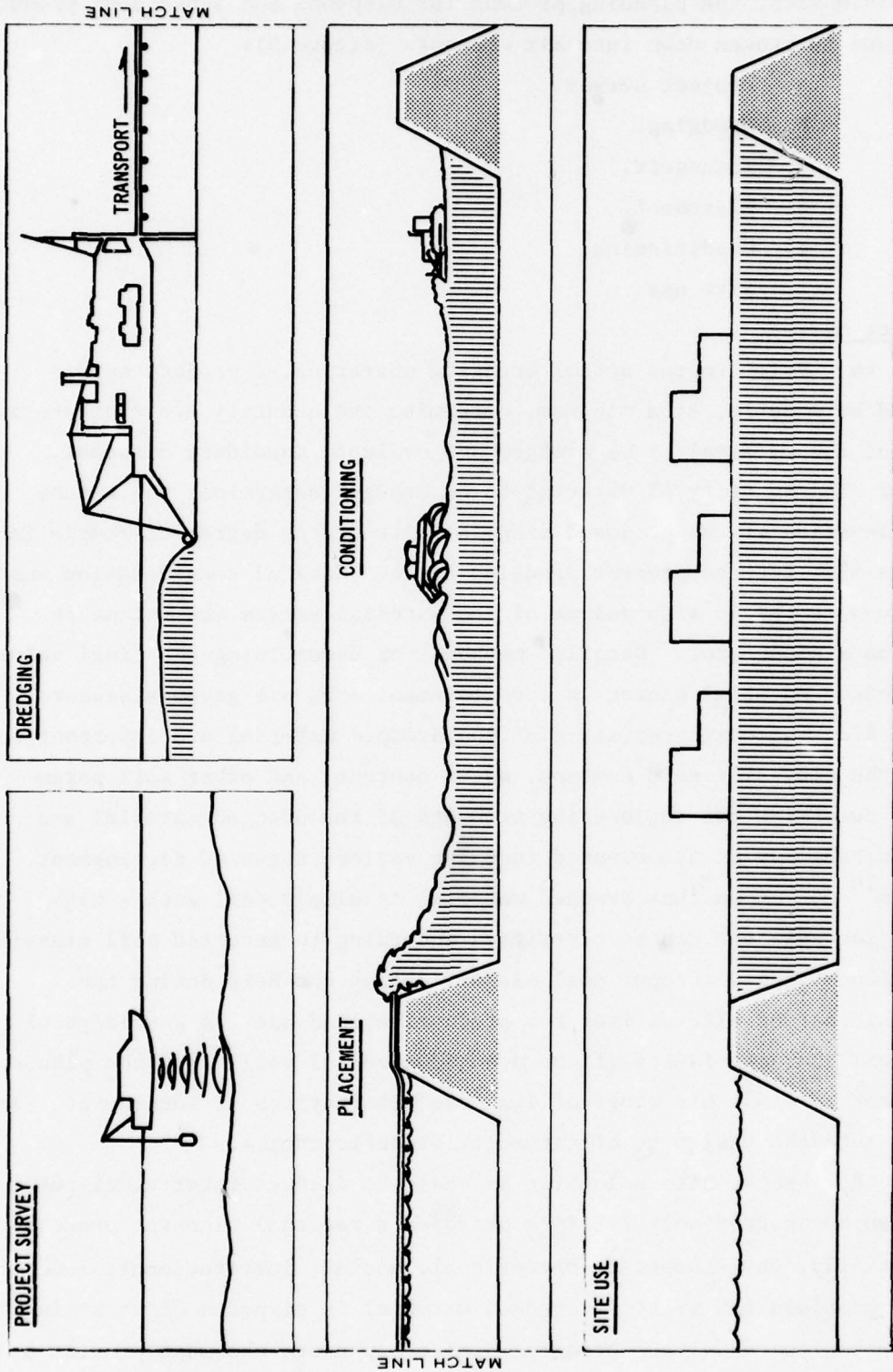


Figure 5. Elements in the disposal-productive use process

disposal site for the material should develop a list of alternative sites as early in the planning process as possible. The site selection process should consider all factors necessary to provide a cost-effective disposal site that is environmentally and socially compatible with its surroundings.\* Basic to this report is the contention that specific end use requirements should be considered at this very earliest stage in the overall planning of the disposal project.\*\*

#### Dredging

49. The type of dredging method employed affects the ultimate land use of containment areas. Hydraulic dredging is the predominant method used to dredge navigable waterways. Large amounts of water are mixed with the in situ sediment during this dredging process. This action affects the engineering characteristics of the dredged material and requires a containment area designed to remove the excess water. On the other hand, clamshell dredging can preserve the integrity of the bottom sediment but is limited by the low rate of production.

50. The timing of the dredging in terms of the period between dredging cycles can affect the later conditioning of the site for productive use. If dredging cycles are frequent, there may be little time to condition the site for its ultimate use. If frequent cycles cannot be avoided, consideration may have to be given to building discrete compartments in the containment area to separate the new and older deposits of dredged material so that conditioning can proceed. Decisions on when to dredge should take this factor into account.

#### Transport

51. The importance of the transport of dredged material depends upon the distance from the dredging to the disposal site. If the containment area is nearby (less than 2 miles away), pipelines, short-haul

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\* Two guides are available for candidate site selection: one, a checklist for determining potential inland disposal sites,<sup>21</sup> and the other, a list of physical planning elements necessary to address disposal-productive land use planning (Part VI of this report).

\*\* This contention will be referred to again in a subsequent discussion in Part VII, as part of the "systems" approach to disposal-productive land use planning.

barges, or hopper dredges can move the material with little difficulty. Longer distances require extra booster systems for pipelines or combinations of transport components (pipeline, barge, rail, conveyor belt, truck) to form a transport system.

52. A novel transport idea for dredged material disposal includes the use of a rehandling area. A rehandling area can serve two purposes. First, it can be a transfer point between modes. For example, barges can be pumped out into a rehandling basin and the material then hydraulically pumped to the final site. Second, a rehandling basin can, in fact, be a disposal area reuse site. In this concept, the dredged material is dewatered and then transported in a dry state for a material use elsewhere. The advantage of a reuse site is that, for every cubic yard of material removed, a cubic yard of new storage is created. Examples of material uses from such sites are noted in paragraph 34 of this report.

53. The long-distance transport of dredged material is a vital element in a systematic approach to disposal-productive use planning. The ability to select and use the best sites for disposal-productive use alternatives depends on the availability of transport systems to move the dredged material from the dredging site to the containment areas. A detailed study of the engineering, economic, and environmental aspects of the transport problem has been completed.<sup>22</sup> The reader is referred to the report of this study for information on transport systems and individual transport modes and the costs associated with transport of dredged material over long distances.

#### Placement

54. The placement of dredged material in the containment area requires consideration of the site where the material is to be placed and the method of placement.

55. Clearly, the size and configuration of the proposed site affect the placement operation. Based on estimates of dredged material quantity and standards for effluent water quality, the containment area size and shape are constrained. Plans for productive use must realize these limitations.

56. The foundation material at the site governs its suitability for subsequent use as much as does the quality of dredged material. Thorough analyses must be conducted to ascertain foundation conditions. The techniques for a predisposal survey are discussed in another DMRP synthesis report.<sup>14</sup> Foundation conditions are further discussed under "Technical factors" in Part VI.

57. Often the site must be prepared for disposal by grading, removing brush, etc. Site preparations that are important for ensuring adequate containment area operation and subsequent drying of the dredged material are discussed elsewhere.<sup>15</sup>

58. During hydraulic dredge operations, active disposal site operation includes checking dikes for leaks, proper operation of the weir, placing the inlet pipe for the dredged material, and maintaining adequate ponding. A most important consideration is the location of the inlet pipe. Since dredged material segregates in a disposal operation with the coarse-grained material depositing near the inlet, the pipe can be moved so that the coarse-grained material is put where it will best serve the purposes of the later use.

#### Conditioning

59. Dewatering, consolidation, and treatment of contaminated material are the major conditioning steps in a dredged material containment area. Dewatering and consolidation are primary considerations in creating stable land with suitable geotechnical properties for land uses. Treatment, if necessary, is generally limited to removing suspended solids from the effluent.

60. Dewatering can be a natural process governed solely by evaporation and gravity drainage, or it can be a process assisted by man. Progressive trenching and hydraulic underdrainage through sand layers or vacuum well points were just some of the dewatering techniques studied.<sup>17</sup> Dewatering improves the engineering strength of the dredged material and hastens its availability for subsequent use.

61. Consolidation of the dredged material is primarily a function of dewatering and pressure. Both the dredged material and the foundation soils compress as water is removed and dredged material is piled

above inducing pressure in the lower section. Of primary concern to the designer of the containment area are the amount and rate of consolidation. Haliburton<sup>17</sup> discusses models for predicting the short-term amount and rate of consolidation.

#### Site use

62. The final element in the productive land use process is site use. If proper planning and engineering have been applied to the prior five elements, the site should be suitable for a productive land use. However, site use also entails the actual development of the site for its productive land use. In most cases the sponsor for the dredging will be responsible for putting the land use into effect in the containment area.\* The degree of success will be proportional to the amount of cooperation among all parties concerned. Discussion of an increased Corps role in site use planning is contained in Part VII of this report.

#### Environmental Aspects

63. The productive land use of dredged material containment areas entails the potential for physical, chemical, biological, and aesthetic impacts on the environment. These impacts must be considered when planning for the land use of containment areas. It should be noted that, with the exception of the added impacts of the land use itself, the environmental implications of a productive land use project are similar to those impacts from conventional disposal.<sup>2</sup> However, the proposed use of the site may assist in mitigating adverse impacts.

#### Physical

64. Physical impacts manifest themselves in terms of changes in the existing character of the land or water in which the containment area is built, the ecosystem changes caused by the addition of the land mass, and the indirect impacts of the land use option selected after

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\* Ultimate project success is dependent, at this juncture, on achieving coordinated disposal-productive land use planning among the Corps, the sponsor, and the community.

the disposal-productive land use project is completed.

65. When dredged material is confined in water or on land creating fast land, the existing submerged or wetland areas are destroyed. Wetland filling is a particularly controversial disposal alternative. Careful thought must be given to the value of the existing areas, e.g., loss of aquatic or wetland habitat versus the need for disposal and the value of the subsequent productive use. The most significant opposition to a productive land use proposal is usually based on this issue.<sup>2</sup>

66. When the problem of changes to the existing character of a site are resolved, the changes induced by the land mass on the ecosystem must be addressed. These physical impacts include changes in infiltration, surface water flow regimes, groundwater levels, and erosion/deposition patterns.<sup>23</sup> Model studies may have to be conducted when the productive land use site is placed in a critical hydraulic area or is large enough to affect the bay or river system. Floodplain impacts can be acute in specific cases. All impacts that result from the presence of a new land mass in the ecosystem must be considered.

67. Planning for the land use options to be implemented on the site must include consideration of indirect impacts. Air, water, and solid waste residuals from the site must be dealt with to prevent environmental degradation. Also, development on the site may induce similar types of development nearby, compounding the impacts. Seldom is thought given to these indirect impacts, especially in productive land use projects. In many cases, plans for the productive land use of a containment area will require an accompanying Environmental Impact Statement (EIS) addressing all environmental impacts.

#### Chemical

68. Dredged material may contain a number of chemical contaminants introduced into the waterway from point and nonpoint sources of domestic, industrial, and agricultural wastes. These chemicals become incorporated into the sediment matrix and are then transferred to the containment area along with the dredged material, thus causing chemical impact. The significance of the impact depends on the extent to which these chemicals are released from the sediment into the environment and their

effect on living organisms. Changes in chemical conditions and the bio-availability of certain chemicals can occur when bottom sediments are placed in an upland environment.<sup>24</sup>

69. Many chemical impacts can occur during the active disposal operation. Effluent from the site may contain chemical contaminants that can cause water quality degradation. However, proper design of the containment area can enable the site to retain most solid material and most contaminants.<sup>14</sup>

70. Both during and after disposal, the runoff and leachate from the containment areas can release chemicals into surface and/or groundwaters. These pathways for chemical contaminants were the subject of several DMRP studies.<sup>18,25,26</sup> The potential for chemical pollution from containment areas was evaluated in these studies.

#### Biological

71. Biological impacts from the disposal-productive use of dredged material are manifestations of physical and chemical effects on plants, animals, and humans. For example, benthic organisms may be destroyed by the placement of dredged material on water bottoms.<sup>27</sup> In other cases, toxic chemicals may be taken up by plants and recycled into the ecosystem. The biological impacts of dredged material disposal-productive use projects were examined in the DMRP. Several reports from these projects document these impacts and suggest methods for their curtailment.<sup>18,19,28</sup>

#### Aesthetic

72. The aesthetic impact of dredged material containment areas is readily evident upon first inspection of a typical disposal area. Rigid lines dominate the setting with barren, earthen dikes containing an unappealing slurry or droughty soil. Conventional designs of most disposal areas provide little aesthetic appeal.

73. It is important, especially for productive land use planning, to incorporate aesthetic considerations into designs for containment areas. Such features as curvilinear boundaries, irregular mounds on the dikes, interior contours, and landscaping on exterior dikes might be used to design a more aesthetically appealing containment area. Another

DMRP report<sup>29</sup> and an illustrated brochure<sup>30</sup> present landscaping concepts that can be used by containment area designers to improve site aesthetics.

#### PART IV: SOCIOECONOMIC CONSIDERATIONS

74. Dredging in our Nation's waterways and harbors is necessary to maintain navigation. However, the costs of dredging must be justified by documenting the socioeconomic benefits that can be derived from a network of navigable waterways. Tangible dollar benefits are generally savings in shipping costs realized by shippers using the waterways.

75. In addition to the dredging costs, the costs of disposal of dredged material from waterways are substantial. In conventional disposal operations potential benefits are usually ignored, so the cost of the disposal operation is simply part of the total cost of the entire dredging-disposal project.

76. However, if productively used, dredged material can indeed provide socioeconomic benefits. Uses of either the material itself or the containment area in which it is placed are options. Land enhancement benefits from the placement of dredged material can be substantial. While it is not Corps policy to promote navigation projects that primarily benefit land development,<sup>31</sup> the value of new or filled land created by disposal of material dredged from a project is a valid benefit that can be credited to the overall project. Both new and maintenance dredging projects should evaluate land enhancement benefits.

77. In keeping with the spirit of the "Principles and Standards"<sup>32</sup> and related Corps regulations,<sup>33-38</sup> an analysis should also be made of the associated socioeconomic benefits and costs of the disposal of dredged material. This process should consider several alternatives for disposal including productive uses and should consider all benefits and costs, tangible as well as intangible.

78. To aid the planner/engineer in the evaluation of the land enhancement value and associated benefits that can be derived by the productive use of dredged material containment areas, a land value methodology has been prepared.<sup>5</sup> The methodology is basically designed to provide guidance for projects still in the early planning stages and produces estimates of (a) the direct market value of the created land, and (b) related community benefits and adverse impacts from the

productive land use. The use of this methodology by both Corps and local planners can help highlight the many advantages of the productive land use of dredged material. Project sponsors and local officials may gain wider public support for innovative productive land use projects if they can effectively demonstrate to the community the full range of benefits of project implementation.

79. The policy implications of including the full market value of the created land and other spin-offs from a productive land use project are discussed in Part VII. The rest of this Part provides an overview of the methodology to determine these benefits and presents the results of an application of the methodology to 15 case study sites. For a detailed discussion of the methodology and the development of the case studies, the reader should refer to the Conrad and Pack report.<sup>5</sup>

#### Methodology

80. The basis for the land value portion of the methodology is the comparable sales approach often used in real estate appraisal. This approach was considered the most appropriate for the value estimate of newly created land. For the assessment of associated benefits and adverse impacts resulting from the land use project, a matrix has been devised to categorize and describe all relevant effects and aid the planner with his evaluation.

81. The methodology itself can be broken into four sections:

- a. Section I: Site description.
- b. Section II: Establishment of use potential.
- c. Section III: Estimate of value.
- d. Section IV: Associated benefits and adverse impacts.

The first three collectively estimate the site value changes, and the fourth identifies the associated benefits and/or adverse impacts of the land use project.

#### Site description

82. Before an analysis of the value of a site can begin, the site must be described in terms of its physical features, environmental

setting (including natural and man-made areas), and relationship to the economic structure of the area. This phase of the methodology is primarily a data base for subsequent analyses. Many of the items of importance to the value of the prepared site will emerge during the course of this data gathering task. If the planner takes the required time to develop the data needed for this section of the methodology, the final estimate of value can be made with more confidence.

#### Establishment of use potential

83. This section of the methodology establishes the most likely and the highest and best use of the containment area after the dredged material has been placed, dewatered, and consolidated. Normally, the highest and best potential use of a piece of land, within existing legal and institutional constraints, is used as the basis for the value assessment. Values of comparable land in the area determine the value of the new piece of land.

84. The planner establishes the use potential by identifying current land uses surrounding the site, the zoning intensity of various levels of development, and other institutional and legal constraints. Also, the physical characteristics identified in Section I must be considered. For example, a land use site comprised of fine-grained dredged material will not be suitable for high-rise developments despite other positive attributes. Finally, the accessibility of the site to the existing infrastructure is an important determinant of practical use potential.

#### Estimate of value

85. This section of the methodology is the final stage in the actual site valuation process. For the successful accomplishment of this section, an economist or real estate appraiser familiar with land values should be involved.

86. Three key functions must be performed in the estimation process:

- a. Land parcels similar to the site to be created by the containment area and for which there are recent sale or assessment data must be identified.
- b. An estimate of demand for the new site must be made based

on the information obtained in the estimate of use potential.

- c. The relative utility of the comparable sites versus the new site must be determined.

87. As noted above, values of comparable pieces of property are the basis on which the market value estimate is made. Once the comparables have been identified and their value established, a utility estimate is made to determine how similar, with respect to "value-producing" factors, the comparables and the new site are. If the comparables and the new site are similar with respect to accessibility, proximity to public services, foundation constraints, etc., then the comparables can be considered to have equal utility to the new site and be used to establish site value.

88. Using the relative utility measure and the demand for the new land use, an adjusted value for the new site can be estimated. By comparing this value estimate with the original value of the site before the dredged material was deposited, a land enhancement benefit can be estimated.

Associated benefits  
and adverse impacts

89. The direct increase in market value of a site from the placement of dredged material is an important land enhancement benefit; however, the induced associated benefits and/or adverse impacts can also be substantial. These benefits and impacts may touch many different economic groups in a wide geographic range away from the site.

90. The methodology can assist the planner/engineer in identifying these benefits and impacts, describing their magnitude and significance, and displaying them for decisionmakers and the public.

91. Two guides were developed to assist in identifying the significant benefits and impacts resulting from the productive land use of dredged material containment areas.<sup>5</sup> One guide graphically shows the relationships of various categories of effects which could result from a productive land use. The other lists specific types of social, economic, and environmental factors that might be affected by the productive land

use. These guides are by no means all-encompassing but provide a framework for identification of the important benefits and adverse impacts.

92. Once the benefits and adverse impacts are identified, a matrix is used to describe and evaluate them. The matrix has a simple structure, and the evaluation is based on the judgment of the planner/engineer involved in the process. No general weighting system was considered appropriate for the evaluation of these associated benefits and adverse impacts. However, the matrix allows this subjective evaluation to be displayed so that other interested parties can review them.

93. An important point should be remembered when using this methodology. The entire methodology is intended as a set of guidelines, and it involves the application of sound judgment by planners/engineers and other specialists in a multidisciplinary group. Deviation from the methodology may be warranted where sound judgment dictates that the situation being investigated does not lend itself to application of the methodology.

#### Case Examples

94. In developing the methodology, 15 case study sites were examined and the methodology tested on each. As developed, the methodology is to be used on undeveloped sites for planning purposes. Sites that were already developed were selected in the interest of getting a diverse group for testing.

95. The results of the case studies indicated that the methodology is flexible and adaptable to a wide range of sites.

96. Table 2 lists the case study sites along with their physical and dredged material characteristics. Table 3 shows the settings of the case study sites. A wide range of sites were chosen as can be seen by examining these tables.

97. Table 4 is a compilation of the estimated change in land values of the sites as a result of turning them to productive use. The values indicate that through productive use dredged material containment

Table 2  
Case Study Site Physical and Dredged Material Characteristics  
(from Conrad and Pack<sup>5</sup>)

Site	Location	Approximate Size		type	grain size	Soil Characteristics		Depth to Foundation Strata	
		ha	acres			bearing capacity	vegetative support	m	ft
Anacortes	Anacortes, WA	11	26	Sand/ clay	Fine	Fair	Good	8	25
Artificial Island	Salem County, NJ	81	200	Silty clay loam	Fine	Fair	Good	21	70
Bay Port	Green Bay, WI	233	575	Sand/ clay	Fine	Poor	Good	5	15
E. Potomac Park	Washington, D.C.	133	329	Silt/ clay	Fine	Poor	Good	31	100
Fifth Avenue Marina	San Diego, CA	9	22	Fine sand	Fine	Fair	Good	NA	
Florida State Fair- grounds	Hillsborough Co., FL	112	276	Silt/ clay	Fine	Poor	Good	NA	
Hookers Point	Tampa, FL	162	400	Silt/ clay	Fine/med- dium	Fair	Good	NA	
Hoquiam	Hoquiam, WA	18	45	Sand/ silt	Fine	Fair	Good	10	34
Patriots Point	Charleston, SC	182	450	Silty Loam	Fine	Poor	Good	18	60
Vicksburg	Vicksburg, MS	142	350	Sand/ silt	Fine	Good	Good	12	40
Virginia Beach	Virginia Beach, VA	17	43	Sand & clay	Fine to medium	Fair	Poor	NA	
Pelican Island	Galveston, TX	1306	3225	Silt/ clay	Fine	Fair	Good	NA	
Port Jersey	Jersey City, NJ	172	430	Sand/ clay	Fine to medium	Fair	Poor	23	75
Blount Island	Jacksonville, FL	680	1700	Silt/ clay	Fine	Good	Good	25	80
Rivergate	Memphis, TN	172	425	Sand/ clay	Medium	Good	Good	NA	

Table 3  
Case Study Site Settings (from Conrad and Pack<sup>5</sup>)

Site Name	Productive Use	Water and Sewer	Urban Setting	Zoning	Access
Anacortes	Industrial/Manufacturing	To site	Urban/port	Industrial/Urban	Excellent
Artificial Island	Nuclear Power Plant	None nearby. Developed their own services	Rural	Industrial/Urban	Poor
Bay Port	Industrial/Port	Nearby	Urban	Industrial/Urban	Good
E. Potomac Park	Park	On-site	Urban	Open Space	Excellent
Fifth Avenue Marina	Marina/Park	Adjacent to site	Urban	Open Space	Excellent
Florida State Fairgrounds	State Fairgrounds	On-site	Suburban	"Urban Transition"	Good
Hookers Point	Industrial/Port Facility	On-site	Urban/port	Industrial/Urban	Excellent
Hoquiam	Industrial/Manufacturing	0.2 km (.13 mile) from site	Urban/port	Industrial/Urban	Good
Patriots Point	Museum, marina, golf course, hotel	Water extended to site. Package sewage treatment plant installed.	Suburban	Commercial/Agricultural/Open Space	Fair
Vicksburg	Industrial/Manufacturing	Adjacent to site	Suburban	Open Space	Good
Virginia Beach	Beachfront Commercial	Adjacent to site	Urban	Residential/Commercial	Excellent
Pelican Island	Industrial/Residential/Institutional/Recreational	To site	Urban	Industrial/Residential/Open Space	Excellent
Port Jersey	Industrial/Commercial	On-site	Urban	Industrial	Excellent
Blount Island	Industrial	To site	Suburban	Industrial	Excellent
Rivergate	Industrial	On-site	Suburban	Manufacturing	Excellent

Table 4  
Case Study Site Valuation Study (from Conrad and Pack<sup>5</sup>)

Site Name	Use Considered for Valuation	Raw Value Prior to Dredged Material Placement		Adjusted Present Value		Enhancement Value	
		per ha	per acre	per ha	per acre	per ha	per acre
Anacortes	Industrial/Port	\$5,400/ha	\$2,200/acre	\$43,200/ha	\$17,500/acre	\$37,800/ha	\$15,300/acre
Artificial Island	Nuclear Power Generation	\$12/ha	\$5/acre	\$3,200/ha	\$1,300/acre	\$3,200/ha	\$1,300/acre
Bay Port	Heavy Industrial	Nominal	Nominal	\$16,100/ha	\$6,500/acre	\$16,100/ha	\$6,500/acre
E. Potomac Park	Recreational	None		\$645,900/ha	\$261,500/acre	\$645,900/ha	\$261,500/acre
Fifth Avenue Marina	Recreational/Open Space	\$10,800 to \$26,900/ha	\$4,300 to \$10,900/acre	\$1.94 million to \$2.60 million/ha	\$784,000 to \$1.0 million/acre	\$1.92 million to \$2.60 million/ha	\$779,990 to \$1.0 million/acre
Florida State Fairgrounds	Commercial/Retail	\$11,100/ha	\$4,500/acre	\$106,300/ha	\$43,000/acre	\$95,100/ha	\$38,500/acre
Hookers Point	Deepwater Terminal Facilities	Nominal	Nominal	\$160,600/ha	\$65,000/acre	\$160,600/ha	\$65,000/acre
Hoquiam	Industrial/Port	\$2,000/ha	\$800/acre	\$13,100/ha	\$5,300/acre	\$11,100/ha	\$4,500/acre
Patriots Point	Commercial/Recreational	\$5/ha	\$2/acre	\$43,000/ha	\$17,400/acre	\$43,000/ha	\$17,400/acre
Vicksburg	Industrial/Port	\$5,600/ha	\$1,700/ha	\$5,600/ha	\$1,700/ha	Maintenance Value	Maintenance Value
Virginia Beach	Commercial/Retail	\$1,725/ha	\$700/acre	\$19,266/ha	\$7,800/acre	\$17,540/ha	\$7,100/acre
Pelican Island	Industrial/Residential	\$35,000/ha	\$14,000/acre	\$198,000/ha	\$79,000/acre	\$163,200/ha	\$65,200/acre
Port Jersey	Industrial	\$16,055/ha	\$6,500/acre	\$83,360/ha	\$33,750/acre	\$67,305/ha	\$27,250/acre
Blount Island	Industrial	\$11,100/ha	\$4,500/acre	\$134,500/ha	\$54,500/acre	\$123,400/ha	\$50,000/acre
Rivergate	Manufacturing						

areas can realize significant increases in value. The wide range of value increases shows that the value increase is a site-specific characteristic. The methodology, however, allows the planner/engineer to estimate this change before the site is developed.

98. Table 5 is presented to show the types of associated benefits and adverse impacts that were encountered during the case studies. Details of the case studies are available in the Conrad and Pack report.<sup>5</sup>

#### Use of the Methodology

99. The large land enhancement benefits that can accrue from the productive land use of dredged material make this alternative to conventional disposal particularly attractive. The methodology described in this Part is a tool that can be used in the planning stages to identify and evaluate both the tangible increase in market value and other benefits to be derived from productive land use. Use of this methodology by Corps Districts can only serve to point out these benefits and/or adverse impacts so that an appropriate disposal alternative will not be overlooked.

Table 5

**Case Study Sites--Associated Benefits/Adverse Impacts**  
**(from Conrad and Pack<sup>5</sup>)**

Associated Benefits/Adverse Impacts	Anacortes	Artificial Island	Bay Port	E. Potomac Park	Fifth Ave. Marina	Florida State Fairg.	Hookers Point	Hoquiam	Patriots Point	Vicksburg	Virginia Beach	Pelican Island	Port Jersey	Blount Island	Rivergate
Adjusted Value Increase						X	X				X				
Increased Business Activity			X		X	X	X				X		X		X
New Jobs	X	X	X			X	X	X	X	X	X	X	X	X	X
Increased Taxes/Revenues	X		X		X			X		X	X				
. Sales	X					X	X	X	X		X	X			X
. Real Estate	X	X	X			X	X		X			X	X	X	X
Community Attractiveness				X	X	X			X		X				
General Boost to Economy	X		X			X	X		X			X		X	X
Operations Revenue						X	X		X						
Provide Needed Community Facilities				X	X	X	X						X		
Increased Recreation Opportunities				X	X	X			X		X	X			
Construction Jobs	X						X					X	X		X
Utility Taxes	X														X
Decrease in Area Taxes	X														
Public Educ. (re: Nuclear Power Plants)	X														
Increased Congestion	X	X		X					X		X			X	
Higher Property Taxes															
Environmental Degradation	X	X		X					X	X		X		X	
Increased Municipal Expenses															
Limits Area Development Potential	X														
Community Concern	X									X				X	
Detracts from Adjacent Vistas									X		X				
Improved Medical Care Services	X														
Provide Needed Power	X														
Educational/Cultural Opportunities									X						
Expands Area Tourist Potential									X						
Introduce Alt. Transportation Mode							X	X		X			X	X	
Create Site for Admin. Offices				X											X

## PART V: LEGAL AND INSTITUTIONAL CONSIDERATIONS

100. Since enactment in 1969 of the National Environmental Policy Act with its requirement for environmental full disclosure (including, in this case, a detailed accounting of disposal alternatives), pressure for greater reliance on land disposal of dredged material has increased significantly. Concerns for improvement and/or maintenance of water quality and protection of aquatic nursery and feeding areas have been factors in removing open water and peripheral wetlands from the inventory of potential disposal sites. Although neither open waters nor wetlands can be categorically dismissed from consideration as disposal options, dredgers have, of legal necessity, turned their attention toward upland areas, transferring the disposal problem from an aquatic to a land environment.

101. In this context, disposal planners must now consider the legal/regulatory framework associated with land use control. Historically, land use control has been vested in individual property or ownership rights. Only recently has the Federal Government become involved in land use control. Traditionally, patterns of land development have been controlled at the local government level, with each jurisdiction seeking to maximize its tax base and minimize its social problems while usually ignoring the practices of neighboring communities in this area. In recent decades, an impetus to control land use has developed and intensified due to increased urban sprawl, the attendant reduction in natural or open areas, and, even more recently, a heightened awareness of the socioeconomic and environmental impacts associated with uncontrolled development. This concern has led to a profusion of legislation at the Federal, state, and local levels designed to control the use of land in response to a variety of circumstances and vested interests.

102. This legislation reflects a significant change in attitude toward land. The attitude now taking hold is that land is no longer solely a commodity to be exploited for economic gain, but also must be considered a critical resource--in finite supply--to be protected for the betterment of the quality of the human environment.<sup>39</sup>

Reinforcing this attitudinal change is recognition that injury to the aesthetic or environmental well-being of the individual gives him favorable standing in the courts (*Sierra Club v. Morton*, Supreme Court of the U. S., 1972). Traditionally, interests alleged to have been injured were restricted to those with economic value. Broadening the categories of injury to reflect aesthetic, conservational, and recreational values has allowed environmental issues concerning the effects of land use to be entered into litigation.

103. Realizing this expanding and highly fluid legal framework, planners at all levels must keep abreast of variations in legislative trends and societal attitudes to ensure comprehensive planning and development of all resource-oriented projects. The following sections attempt to describe Federal, state, and local roles as they might affect the implementation of productively used dredged material containment areas. This discussion will include key legislation affecting land use in general, since most laws make no distinction between dredged material containment areas and other types of landforms. The reader should note early on that the state role will be dominant in the area of impacts on dredged material containment area planning and implementation. As societal pressures for the wise use of environmental resources grow, changes in institutional arrangements are likely to continue. One of these changes is an expanded state role in land use control.

#### Federal Role

104. The Federal Government is a major landholder but statutorily is not a major land controller. As derived from their police powers, state and local governments retain most of the land use control authority. The Federal role is founded upon the Commerce Clause (Article I, Section 8), which has been greatly expanded by Supreme Court interpretations to include establishing sweeping limits on activities as they affect interstate commerce.\* This, plus the influence generated

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\* This regulatory power has been defined to include regulation of the use and development of navigable bodies of waters and their beds in the public interest. Such power is referred to as "navigation servitude" and is vested in the Corps of Engineers.

by the vastness of the Federal estate and the appeal of Federal grant, technical assistance, and aid programs make for a predominant role in the land use regulatory hierarchy. Unquestionably, the Federal Government provides legislative leadership.

105. The primary thrust of existing Federal legislation pertinent to this study is channeled into several well-defined areas. They are enumerated below; included under each heading are the significant laws of likely concern to dredged material containment area planning.

- a. Restriction on activities affecting navigable waterways.
  - (1) River and Harbor Act of 1899 (33 U.S.C. Sec. 401 et seq.).
  - (2) Rivers and Harbors and Flood Control Acts of 1970 (Public Law 91-611).
  - (3) Water Resources Development Act of 1976 (Secs. 148 and 150, Public Law 94-587).
- b. Permit/review systems to ensure compliance with Federal environmental policy.
  - (1) National Environmental Policy Act of 1969 (NEPA) (42 U.S.C. Sec. 4341; Public Law 91-190).
  - (2) Environmental Quality Improvement Act of 1970 (42 U.S.C. Sec. 4374).
- c. Protection of wild and scenic areas and fish and wildlife and their associated habitats.
  - (1) Fish and Wildlife Coordination Act of 1970 (FWCA) (16 U.S.C. Sec. 661-667).
  - (2) Endangered Species Act of 1973 (Public Law 93-205).
  - (3) Wild and Scenic Rivers Act of 1976 (16 U.S.C. Sec. 1274 et seq.; Public Law 94-486).
- d. Control of land use in flood hazard areas.
  - (1) National Flood Insurance Act of 1968 (Public Law 90-448).
  - (2) Flood Disaster Protection Act of 1973 (Public Law 93-234).
- e. Coastal and marine protection.
  - (1) Coastal Zone Management Act of 1972 (CZMA) (16 U.S.C. Sec. 1451 et seq.; Public Law 92-583).
  - (2) Marine Protection, Research, and Sanctuaries Act of 1972 (Public Law 92-532).

f. Water quality protection.

- (1) Federal Water Pollution Control Act Amendments of 1972 (FWPCA) (33 U.S.C. Sec. 1251 et seq.; Public Law 92-500).
- (2) Clean Water Act of 1977 (Public Law 95-217).

Of these legislative acts of most likely concern to dredged material containment area planning, five are of sufficient impact to merit the brief summaries that follow. Discussion of the other acts can be found in the Skjei,<sup>3</sup> Cole and Brainard,<sup>4</sup> and Conrad and Pack<sup>5</sup> reports.

River and Harbor Act of 1899 (RHA)

106. In the RHA, Congress designated the Corps of Engineers responsible for the enforcement of navigation servitude. Under this authority, the Corps can regulate work (construction, filling, dredging) and all structures in the navigable waters of the U.S. Skjei<sup>3</sup> points out that, in the exercise of this authority, two important administrative or legal issues arise. One is the extent of the area over which the Corps exercises jurisdiction; the second is the criteria that should be used in making a permitting decision.

107. Corps jurisdiction, which is now defined by the legal definition of the term "navigable waters," has been a topic of much discussion elsewhere.<sup>40,41</sup> It will not be treated here as it does not advance this discussion. The reader, however, should be aware of the FWPCA and the Corps Section 404 permit program, therein, for dredging and filling wetlands.\*

108. Regarding the second issue, the criteria used by the Corps in its permitting process have changed in recent years, partly in response to the societal/attitudinal changes noted in the introduction to this Part. The RHA, if strictly read, suggests that the Corps should

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\* Whereas the FWPCA assigned the Secretary of the Army, acting through the Chief of Engineers, to regulate discharges of dredged and fill material into the navigable waters of the U. S., the Clean Water Act (actually an amendment to the FWPCA) withdraws Phases II and IV of the Corps' three-phase permit jurisdiction, in favor of the states.

consider only navigational concerns in judging whether to issue a permit. However, environmental legislation such as the broadly based NEPA and the more specific concerns of the CZMA, the FWCA, and the FWPCA compels the Corps to consider a broader range of factors in issuing and administering permits. In 1968, prior to most of this legislation, the Corps began to recognize the need for a broader set of criteria and instituted a permit review process that was centered on the preservation and enhancement of the public interest.<sup>3</sup>

109. The concept of the public interest review process is specified in Engineer Regulation 1145-2-303.<sup>42</sup> According to paragraph 7a, "the decision whether to issue a permit will be based on an evaluation of the probable impact of the proposed structure and its intended use on the public interest." Among the factors that ought to be considered as comprising the public interest are economics, recreation, water supply and quality, conservation, aesthetics, and the general "needs and welfare of the people." Four criteria are currently used in the evaluation of every permit application (para 7b):

The relative extent of the public and private need for the proposed structure or work.

The desirability of using appropriate alternative locations and methods to accomplish the objective of the proposed structure or work.

The extent and permanence of the beneficial and/or detrimental effects which the proposed structure or work may have on the public and private uses to which the area is suited.

The probable impact of each proposal in relation to the cumulative effect created by other existing and anticipated structures or work in the general area.

A permit cannot be granted if its issuance is not in the public interest (para 7b). Every application for a permit must be accompanied by ". . . a complete description of the proposed activity, which includes . . . the location, purpose, and intended use of the activity . . ." (para 9b). In the issuance of any permit, "special conditions" may be included "to protect the public interest" (para 14b).

110. As currently stated, these criteria imply a deep concern for

the public interest and the way in which that interest is affected by a number of factors, one of which is land use. Thus, through ER 1145-2-303, the Corps currently has a mechanism for controlling the ultimate use of dredged material containment sites in the public interest.<sup>3</sup>

Rivers and Harbors and  
Flood Control Acts of 1970 (RHFCFA)

111. The RHFCFA authorize the construction, repair, and preservation of certain public works on rivers and harbors for navigation, flood control, and other purposes. They are included here because they are the only Federal legislation that directly addresses dredged material confinement areas and concurrently considers subsequent use after completion of disposal.

112. Over the years, particularly as a result of the continued rapid industrialization and population concentration contiguous to some of our navigable waterways, materials dredged from some harbors have become polluted. As a result of concern over the possibility of adverse effects on water quality or aquatic organisms resulting from dredging and disposal of this polluted material in open water, the Corps as early as 1966 began investigating the feasibility of alternative disposal methods at selected harbors in the Great Lakes. Pending the availability of more definitive information on the environmental impact of various disposal practices and in anticipation of the elimination of many sources of pollution, it was believed that the containment of polluted dredged material for a period of years would result in an improved situation on the Great Lakes. In Section 123 (a)-(h) of the RHFCFA, the Congress authorized the Secretary of the Army, acting through the Chief of Engineers, to construct, operate, and maintain contained disposal facilities of sufficient capacity to handle polluted dredged material in the Great Lakes and connecting channels for a period not to exceed 10 years. At the present time, the Great Lakes area is the only region of the country for which, in the interest of pollution abatement, specific legislation has been enacted providing for the construction of confined disposal areas to contain polluted dredged material irrespective of the local cooperation requirements of existing Federal navigation projects or the

resulting increase in dredging and disposal costs.

113. Section 123(c)(4) provides that the local cooperating interest agree in writing to "maintain the facility after completion of its use for disposal purposes in a manner satisfactory to the Secretary of the Army." Subsection (f) specifies that a disposal facility owned by a non-Federal interest or interests may be conveyed to another party only after completion of the facility's use for disposal purposes and after the transferee agrees in writing to the Section 123(c)(4) stipulation.

114. Unfortunately, the RHFCAs as written and practiced provide no quid pro quo; the Corps, acting for the Secretary of the Army, cannot condition approval of a confined disposal facility on the sponsor's pledging to implement a postdisposal productive use. Such a facility must be constructed, regardless of cost, when polluted sediments are to be dredged. Productive use considerations are not included in the preliminary planning and design or considered in final project approval. In practice, only as the containment area nears capacity does the sponsor begin considering a subsequent end use "satisfactory to the Secretary of the Army."

National Environmental  
Policy Act of 1969 (NEPA)

115. The NEPA requires the Federal Government and its agencies to place environmental issues in a position of high priority along with other designated social goals in the Federal decisionmaking process. The term "environment" in the NEPA is used in its broadest sense to encompass not only ecological, but also aesthetic, cultural, historic, and other social concerns, i.e., a sum total referred to as the "human environment."<sup>3</sup>

116. An issue in the productive use of dredged material containment areas is whether the NEPA can be used in an affirmative manner to compel certain uses of land or, more realistically, to compel the choice of land use from a predetermined set of environmentally favorable choices. Although this has not been litigated, it appears that existing case and statutory law would allow such use of the NEPA. Under the RHA, the Corps must issue a permit before any construction, dredging, filling, or other

work can be performed in the navigable waters of the U.S. Although Corps consideration in passing on permit applications has traditionally been directed towards navigation concerns, recently the Courts held the Corps can and must consider environmental factors in passing on permits. In Zabel v. Tabb (430 F 2nd 199 (15th Circuit 1970), cert. den. 401 U.S. 910 (1972)), the Court upheld the denial by the Corps of a landfill permit for fish and wildlife reasons (and not reasons related to navigation). The Court reasoned that under the Commerce Clause, the Federal Government retained plenary authority over the use of navigable waters, other statutes notwithstanding; e.g., the Submerged Land Act. The Court based its decision on those statutes that it felt gave the Corps the discretion to use environmental factors in applying its permit issuing power, i.e., the RHA, NEPA, and FWCA. Of these, the NEPA is clearly the most compelling authority.<sup>3</sup>

117. Section 102 requires the filing of an EIS by Federal agencies on all projects involving "major Federal action." Depending upon project scope and impact, an EIS may be required when the Corps considers a request for a permit to dredge and fill (Section 404, FWPCA) or to perform any construction that affects navigable waters. In those instances, the provisions of the NEPA must be integrated into the decisionmaking process, and the Corps must consider the overall environmental effects of its permit action. Current Corps regulations recognize this requirement. By combining its authority under the RHA to regulate and impose conditions on work affecting navigable waters (thus involving the Commerce Clause and navigation servitude) with the policy directives and mandatory decisionmaking provisions of the NEPA, the Corps could, conceivably, require an applicant to guarantee certain affirmative environmental actions. In a dredge and fill permit case, the Corps might be able to require that dredged material be used to construct a dredged material containment area for a specified functional use. The Supreme Court has continually allowed Federal agencies to place conditions on licenses or permits so as to ensure particular policy goals (Federal Power Commission v. Idaho Power Company; U.S. v. Grand River Dam Authority). Thus, the Corps could condition the granting of a permit for a dredge and

fill project upon a use of the dredged material and the waterway in conformity with the national environmental policies established in the NEPA.<sup>3</sup>

118. On the other hand, a conveyance of land by the Corps can qualify as a major Federal action under the NEPA. Therefore, dredged material containment sites owned by the Corps must be scrutinized from the environmental impact perspective before they may be developed for productive use. This requirement, in effect, means adding a component to the EIS analysis. This addition would justify the proposed productive use in light of the impacts resulting from the use of the disposal site. The EIS would still cover the entire project--from dredging to disposal--including the productive site use, whereas the added component would deal only with the land conveyance for a subsequent productive use.

Fish and Wildlife  
Coordination Act of 1970 (FWCA)

119. Although domestic examples of wildlife and fisheries habitat land uses were excluded from our discussion previously (Part II), mention is included here because fish and wildlife conservation values are a key environmental factor as applied to the Corps permit issuing program.

120. The FWCA was passed in 1934 and later amended in 1958 and again in 1970 for the purpose of providing that wildlife conservation and rehabilitation receive equal consideration and be coordinated with other features of water resource development programs. The enactment of the NEPA has since overshadowed the FWCA, whose provisions almost exclusively supplement those of the NEPA.

121. The FWCA directs acquisition of land and the promotion of programs to conserve wildlife resources, while the NEPA seeks to affect the decisionmaking process by requiring open consideration of all environmental goals. In the area of wildlife conservation, the FWCA is more specific and requires more direct action than does the NEPA, while the latter is broader and more far-reaching in scope. The FWCA can be used as a supplement to the NEPA, buttressing the environmental protection and preservation policies in the latter as they specifically affect fish and wildlife.<sup>3</sup>

122. The FWCA, in conjunction with the NEPA, provides an opportunity for the Corps to construct a policy for issuance of permits that seeks to enhance national environmental goals. As was shown by Zabel v. Tabb, the FWCA provides authority for protection of the environment by means of Corps permits. By a 1967 Memorandum of Understanding between the Departments of the Interior and the Army, every permit application can be reviewed in light of its possible effect on fish and wildlife. Through recommendations and the withholding of permits for work (dredging, filling, or excavation) that threatens the environment, the Corps is instrumental in wildlife conservation.

123. The Corps can also use both the NEPA and the FWCA in conjunction with private and Federal projects to take an active part in establishing recreational land use patterns surrounding such projects. Because of the authority granted by the FWCA, the Corps can acquire land for the specific purpose of wildlife conservation in the area surrounding a water resource development project and under the NEPA can harmonize that goal with recreational goals.<sup>3</sup>

Coastal Zone  
Management Act of 1972 (CZMA)

124. Since the advent of the NEPA, several bills have been introduced in Congress designed to create a land use policy at the national level.\* The theme, common to these bills, has been to encourage and assist the states to prepare and implement land use programs. Passage of these measures has not been forthcoming apparently due to an alignment of Congressional forces against a strong Federal role in land use. But Congress has recognized the need for a national policy to address the rising demands for coastal resources and thus enacted the CZMA.

125. The primary goal of the CZMA is to assist the individual states in preparing and implementing management programs to preserve, protect, develop, and restore the coastal resources of the U.S. The

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\* For example, National Land Use Policy Act of 1971, S. 992, H.R. 4432, 92nd Congress; Land Use Planning Act of 1974, H.R. 10294, 93rd Cong., 1st Session (1973); Land Use Policy and Planning Assistance Act, S. 268, 93rd Cong., 1st Session (1973); and Land Use and Resource Conservation Act of 1975, H.R. 3510, 94th Cong., 1st Session (1975).

intent of the act is to enhance state authority by encouraging and assisting the states in assuming planning and regulatory powers over their coastal zones. A system of grants-in-aid provides financial incentive for the establishment of state management programs addressing the wise use of land and water resources. Management programs are to stress ecological, cultural, historic, and aesthetic values as well as the need for economic development. The CZMA neither requires such programs nor seeks to require control over those lands in the zone by Federal preemption. Planners of Federal programs affecting the coastal zone are required to coordinate and participate, as much as is practical, with the states in carrying out the provisions of the act. In effect, the Federal Government is preempting itself in favor of the states in regard to control and management of the coastal zone.<sup>4</sup>

126. Section 307 dictates that any activity that has been so designated by the state as affecting land or water use must have a Federal permit. On all permit applications, it must certify that the applicant's activity is consistent with the state's coastal zone management program.

127. The impact of the above provisions is to lessen the Corps' authority and discretion over water resource development and use. The Corps can only approve those projects which fall within an established structure of development plans and which are, for the most part, approved by the state. Although all activity in navigable waters still requires a permit from the Corps, the Corps is prohibited from issuing a permit unless the activity is consistent with an approved management program.

128. Although the statute does not delineate the types of projects appropriate to a coastal zone management program, the House committee that reported the bill did suggest that, among others, recreation projects be considered by state and Federal planners.<sup>43</sup> With this in mind, Corps planners should be prepared to cooperate in creating small 20- to 30-acre tracts of land (i.e., dredged material containment areas) for use as community or neighborhood recreational facilities. Likewise larger tracts of land (100 or more acres) for use as city or regional recreational facilities are feasible end uses of confined disposal sites.<sup>3</sup>

129. Section 1456 of the act requires adequate consideration by the state of the views of interested Federal agencies "principally affected" by a management program. Thus, the Corps can influence the direction of specific projects of a management program at the initial stages of development. Asserting its expertise and exercising its responsibility to enforce navigation servitude, the Corps can suggest that productive land uses of dredged material containment areas be implemented in appropriate coastal areas.

#### State Role

130. Much of the Federal legislation specifies that the primary responsibility for land use control lies at the state and local level where the basic constitutional authority exists to regulate land use. Since the context of land use conflicts and decisions is usually local or regional, not national, state laws for the most part are the most restrictive legislation affecting the productive use of dredged material containment areas. Much of this legislation is couched in terms of requirements for land use planning. There has generally been little objection to locating at least some planning authority at the state level where the broader view of social, economic, and environmental conditions necessary to plan well exists.

131. Due to their number and variability, a discussion of specific state laws will not be included here. More detailed commentary--limited to a 16-state sample\*--is available in the Cole and Brainard report.<sup>4</sup> The following addresses general concepts and trends in state land use control.

#### Land use planning constraints

132. Constraints imposed by state laws on the planning of dredged material containment areas can collectively be categorized as procedural, substantive, and categorical in nature.<sup>44</sup>

133. Procedural constraints are usually provided for in a state

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\* The 16 states surveyed were: California, Florida, Georgia, Illinois, Louisiana, Maryland, Massachusetts, Michigan, Mississippi, New York, North Carolina, Oregon, Texas, Virginia, Washington, and Wisconsin.

law patterned after the NEPA which requires that actions taken to authorize a significant project include preparation and processing a detailed "environmental impact report" (similar to an EIS under the NEPA). This report is commonly circulated among all state and regional agencies which might have jurisdiction over the project. This procedure often becomes a way of triggering the various exercises of state agency authority which are necessary to authorize the project.

134. Substantive constraints imposed by state statutes are almost infinitely variable. A few states have adopted major facility siting laws which provide for permitting procedures based on review and regulation of the location and environmental effects. These siting laws would be of most concern to commercial or industrial development of dredged material containment areas. A larger number of states have adopted shoreline and wetlands protection legislation which pertains whenever coastal or riverine development is considered. Fish and wildlife protection, historic preservation, and a broad range of other types of state programs may also be of critical importance (some obvious and some not) in the dredged material containment area planning process.

135. Virtually all states, at the insistence of Federal statutes, have specific programs directed toward achieving objectives of "categorical" pollution control laws; i.e., air, water, and noise standards. Although these laws are more remote as potential role players in disposal site planning, they are part of the regulatory framework with which assurance of compliance is normally a condition to project authorization.

Generalized and  
specific area land use planning

136. A few states have enacted generalized land use planning laws which provide for the establishment of regional development plans, the designation of areas of critical environmental concern, and the identification of areas suitable for specific categories of development and those which are not. A somewhat larger number of states have adopted legislation providing for stringent planning and regulation of development in areas of particular environmental value; e.g., the coastal areas (in response to CZMA) and wetlands. The planning and regulatory approach

followed in these areas is more rigorous than the generalized plans mentioned above.

137. Virtually all the local and state review, authorization, and permitting provisions outlined above are overlain by a variety of state and Federal-state planning programs. Thus, the regulatory framework in most states is a combination of a permitting authority for specific facilities and a generalized planning approach for activities that could potentially violate applicable categorical pollution control laws or conflict with substantive planning constraints.

#### State land use and land use planning laws

138. Laws in many states can be categorized as state zoning laws where the state has taken express and direct control over land use control and/or land use planning. The states obviously have the constitutional authority to regulate land use, but they have traditionally ceded a large portion of that authority to local government. But now the developing trend indicates a reversal of that tradition. By the end of 1975, 27 states had a total of 38 operating general land use programs. Twenty-four of the programs established some degree of state authority to coordinate major local land use decisions, 9 took the more traditional approach of mandatory local planning, and 5 were comprehensive state programs involving land use permits to deal directly with land development. All 30 eligible states were participating in the CZMA, and 5 had special laws to protect their shorelines, 22 had wetlands protection laws, 26 regulated development in the floodplain, and 13 had legislation to protect defined "critical areas."

#### State sample survey

139. Cole and Brainard<sup>4</sup> surveyed a 16-state sample of laws impacting on the planning and implementation of dredged material containment areas. These state laws generally fall into two major categories: those directed primarily toward environmental protection and those directed toward land use control. The two categories are not mutually exclusive and much crossover exists. The environmental laws are generally more recent and broader in scope in their emphasis on the preservation of land,

water, and other natural resources. The land use control laws reflect a trend away from local control and toward state regulation. In some cases, state control is not complete; it may take the form of guidelines for local government subscription. Some laws require development of a state land use plan and provide no authority to require local government conformance. State planning agencies in these cases are advisory only but may influence local planning efforts through technical or financial assistance. In other states, more stringent means are undertaken whereby use restrictions are placed on specified areas of critical concern. They may also subject developments that will have a "regional impact" to state-imposed restrictions.

140. Table 6 displays the subcategories of laws surveyed under the two main headings of environmental protection and land use control legislation. Appendix B displays a typical state matrix of environmental protection and land use control laws pertinent to dredged material containment areas. A discussion of each of the subcategories in each state surveyed is contained in the Cole and Brainard report.<sup>4</sup>

Table 6

Subcategories of Laws in State Survey

<u>Environmental Protection</u>	<u>Land Use Control</u>
. Wetlands	. Land Use and Land Use Planning
. Water Quality	. Public Land Laws Controlling State-Owned or Submerged Land
. Wild and Scenic River Systems	. Sediment/Erosion Control
. Wild Lands and Land Conservation	. Floodplain Protection
. Fish and Game Habitat	. Agricultural Zoning
. Environmental Impact Assessment	. Local Zoning Enabling Laws
	. Port District Enabling Laws

## Local Role

### Comprehensive planning

141. The pivotal land use role played by the state is further exemplified by the recent emergence of state laws requiring that counties and localities develop their own land use plans. Mandatory local planning laws are now on the books in at least ten states including Florida, Massachusetts, and Oregon. Traditional, local regulatory mechanisms like zoning, subdivision regulations, and building codes are being supplemented with new ones with heavy emphasis on comprehensive planning. An important legal constraint on containment site development potential will be the scope and quality of planning which occurs at the community and/or regional level.

142. The objective of comprehensive planning legislation is to provide direction to developers and governmental agencies in the use and management of an area's physical and natural environment. Comprehensive plans (master plans, general plans, development plans), when developed and adopted, should form the basis for identifying land use potential. Unfortunately, many jurisdictions have not yet developed comprehensive plans or have not extended the planning areas to include potential containment sites. There are also jurisdictions in which the plans, even though they exist, are often ignored. Therefore, in identifying the development potential of a dredged material containment site, it is necessary to determine both if a plan applies to the site and if the plan has relevance.

### Zoning

143. Zoning is probably the single most commonly used legal device available for implementing the land use plan of a community. Zoning is an exercise of the basic power of the state to enact legislation protecting the general welfare of its citizens. The local power to zone is customarily derived by municipalities from state enabling legislation. Where zoning is consistent with comprehensive plans, the allowed land use within a zoning district would be the basis for establishing development potential for a containment site. In other jurisdictions,

agricultural or low-density residential zoning is used as a holding category with the assumption that developers will petition for rezoning when land development is desired. Zoning can, therefore, be used as an indicator for land use but only after affirming the method of zoning in the jurisdiction.

Floodplain management

144. One of the more significant regulatory factors affecting productive land uses of containment areas at the local level is the set of restrictions pursuant to floodplain management. The National Flood Insurance Program was passed into law in 1968 and subsequently modified by the Flood Disaster Protection Act of 1973 (FDPA). The FDPA prohibits Federal financing of any project where special flood hazards may exist unless a Federal flood insurance program has been instituted for the surrounding area. The purpose of formalized floodplain management is to regulate land use in construction activities which block, back up, or spread floodwaters. Although Federal flood control financing was implemented to protect already existing properties, it has had the effect of encouraging new development projects which have increased floodplain occupancy. To counteract this trend, a 1977 Executive Order restricts Federal executive agencies from undertaking, supporting, or allowing construction and other incompatible development on floodplains unless the agency makes a formal finding that no practical alternative exists.<sup>45</sup>

145. The most severe requirement affecting confined disposal siting and subsequent development is the prohibition against fills and other encroachments within the designated floodway since these are likely to impair the flow and discharge of waters or raise the 100-year flood level. This Federal provision is an absolute requirement unless the local jurisdiction can demonstrate it has made stream improvements which can accommodate resulting flood heights. Project sponsors would therefore be required to incur the added construction costs of flood mitigation structures. Special provisions must then be incorporated into building permit applications which consider designs to prevent the collapse, flotation, or lateral movement of all site structures, e.g., the lowest floor of residential construction must be set at an elevation

equal to or greater than the predicted 100-year flood level.<sup>4</sup>

146. In essence, floodplain management programs and zoning ordinances are the most restrictive local constraints confronting planners of dredged material containment areas. Since most Corps dredging operations occur in or adjacent to the floodplain, close scrutiny of the local floodplain program to ensure compliance with construction and siting restrictions must be followed by similar consideration of zoning conformance for any ensuing productive land development.

147. Cole and Brainard<sup>4</sup> provide a matrix summarizing the floodplain management programs of 25 major cities in the 16-state survey. The matrix illustrates the degree to which localities have incorporated Federal criteria into their programs. Applications for Federal flood insurance benefits continue to be received at the Federal level, indicating increasing and wider use of floodplain management programs.

#### Implications

148. Early DMRP studies focused on specific aspects of increasing public acceptance of confined disposal areas, including the legal conditions and issues that cause public concern. Identified as an important objection to confined disposal facilities was "the uncertainty about or lack of control over" the ultimate use of the site.<sup>46</sup> Adjacent communities resented the lack of control over the ultimate site use, and environmentalists sometimes felt the introduction of another type of land use might have more impact than the undeveloped disposal area itself.

149. The Corps' role in determining ultimate disposal site use can best be enhanced by expansion of the Corps' existing permit power as derived from the "navigation servitude" provision of the RHA and from national environmental legislation. Application of this permit power must be guided by public interest concerns which must be constantly monitored by Corps field elements. Conditioning of permits will have a positive effect on public support of confined disposal projects if public interests are properly reflected. The force of public opinion in

concert with rational, legitimate\* permit conditions can force a productive ultimate use on the part of the project sponsor. Permit conditions could include an affirmative obligation to report to cognizant Federal, state, and local authorities when and why the desired use is not achieved.

150. Full development of the future potential of dredged material containment areas for useful purposes is dependent upon proper project planning and site selection. Planning and siting should simultaneously consider both the disposal facility itself and the proposed productive end use of the resulting landfill. Innovative efforts on the part of Seattle and Chicago\*\* provide excellent examples of "bottom-up" comprehensive planning for disposal area siting. But these examples, as in other possible citations, do not include specific mention of beneficial uses of dredged material confinement areas in their land use planning policies. In the absence of such language and should permit conditions prove to be inadequate for controlling the ultimate use of diked disposal areas in the public interest, alternative means to the same end need to be explored. Congressionally imposed restrictions attached to declarations of nonnavigability or easements and covenants might be approaches with greater legal standing.<sup>3</sup> Ultimately, legislative recognition may be the best solution. To this end, the Corps must bring influence upon the legislative process "from the top down" in urging that productively used dredged material confinement areas be specifically mentioned in future law and policy. The Corps' role must be clearly identified amid the extremes of becoming involved in what could amount to zoning of land use, which has traditionally been the province of local governments, and that of jeopardizing future dredging operations by failing to prevent an unauthorized use of land created from dredged material. A middle ground--most logically at the state level--must be

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\* Permit conditions are susceptible to court challenge if they infringe on private property rights as protected under the Due Process Clause of the Fourteenth Amendment or if they create an instance of "tak [ing], for public use, without just compensation" as prohibited under the Fifth Amendment.

\*\* Seattle Shoreline Master Program and Chicago Lakefront Protection Ordinance.

achieved where Corps influence and local public interests converge cooperatively to analyze the legal issues and forge creative approaches to disposal-productive use concepts.

PART VI: PLANNING AND IMPLEMENTATION FACTORS  
FOR DISPOSAL-PRODUCTIVE USE PROJECTS

151. Corps of Engineers involvement in disposal-productive use projects is managed within the Corps' well-established dredged material disposal planning system. Since the mid-1960's, planning for dredged material disposal, particularly for confined disposal, has become increasingly difficult, primarily as a result of environmental initiatives. Faced with the basic problem of providing sufficient confined disposal capacity, Corps planners have rarely participated in planning for the productive use of the completed sites. Active Corps participation in disposal site productive land use planning is one of several recommendations presented in Part VII for improving the process by which disposal-productive use projects are planned and implemented. In this Part, the numerous planning and implementation factors affecting project success are delineated.

152. The research conducted under the DALU task provided illustrative proof that disposal-productive use project success is as much affected by procedural factors as by substantive factors. The intent of this Part, which is oriented toward Corps planners and engineers, is to provide insight, from a broad perspective, into the applied planning requirements for successful design and implementation of disposal-productive land use projects.

153. The discussion in this Part is organized as follows. First, the important physical planning elements necessary to address in containment facility and productive land use planning are presented. These elements encompass the physical features of potential containment areas that affect project feasibility. Second, 10 land use planning principles for disposal-productive use projects are outlined. These principles serve as indicators of project feasibility when compared to the corresponding planning features of proposed productive land use plans. Finally, an overall set of implementation factors for disposal-productive use projects is presented. These factors provide a framework for ensuring that project planners address all concerns that can affect project implementation.

### Physical Planning Elements

154. The physical planning elements identified in Table 7 are the primary physical features of containment areas and their proposed locations that affect the feasibility of containment facility and productive land use plans. They provide a checklist of potentially positive physical planning elements that can be capitalized on during project design to enhance project feasibility and public acceptance and to maximize site utility. Conversely, they facilitate identification of potentially negative physical planning elements that deserve extra attention during project design to eliminate design inefficiencies.

Table 7

#### Physical Planning Elements of Disposal-Productive Use Projects

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##### Elements Related to Disposal Facility Planning

1. Ecological function and significance.
2. Dredged material composition (disposal area operation).
3. Dredged material volume (disposal area capacity).
4. Subsurface soil conditions.
5. Distance from dredging.
6. Locational requirements of the proposed use.
7. Flood or tide conditions.
8. Utility relocation/connection needs.
9. Sensory factors (appearance, odor, noise, dust, etc.).

##### Elements Related to Productive Land Use Planning

1. Foundation conditions and requirements.
  2. Water and rail access.
  3. Site size and configuration.
  4. Vehicular circulation/traffic generation.
  5. Utility availability and capacity.
  6. Flood or tide conditions.
  7. Detailed site plan compatibility with site features and use requirements.
  8. Sensory factors (appearance, odor, noise, dust, etc.).
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155. The physical planning elements are important agenda items

for early planning meetings for disposal and disposal-productive use projects. They, in effect, form a guide to candidate site selection. Logically, the physical elements have been grouped into two categories, each reflecting a perspective from which site physical features should be viewed in project planning: (a) elements related to disposal facility planning, and (b) elements related to productive land use planning. The two planning perspectives are necessary because, for example, the capacity of a disposal site is a key consideration in planning to satisfy disposal requirements, but it is often of secondary importance in planning for productive land uses. Conversely, vehicular circulation/traffic generation are critical elements during productive land use planning but are of little concern during disposal facility planning.

156. Although grouped into two separate categories, the planning elements should be used simultaneously as a planning tool. More often than not, disposal facility and productive land use planning activities are not initiated and performed simultaneously. With respect to physical concerns, these planning activities should occur concurrently for two primary reasons. First, the physical requirements for disposal facilities and those for subsequent productive land uses vary significantly. To illustrate, consider that foundation conditions often exert a negative influence on the implementation of land use plans since, in many cases, special foundations are needed, thereby imposing an added economic burden on the sponsor/developer. Conversely, water and rail access to a proposed site is often a beneficial attribute that significantly aids implementation of productive land uses, especially heavy industrial uses. Second, the success of a planned use is quite often dependent on elements that must be addressed during disposal facility planning. For example, an assessment of the availability of utilities to satisfy the functional needs of a proposed land use is an important part of selecting a site for a disposal facility. Similarly, the land requirements of a proposed land use development can help determine the size and configuration of a disposal site.

157. Under a holistic or systems approach to the planning of dredging-disposal-productive use projects, the planning elements in

Table 7 provide a planning guide for using physical characteristics to enhance project feasibility and public acceptance and to maximize site utility. They also provide a basis for coordinated disposal-productive use planning from a technical viewpoint. Each of the physical planning elements is discussed in more detail in the case studies analyses report.<sup>2</sup>

#### Land Use Planning Principles

158. For a majority of the disposal-productive land use projects examined under the DALU task, interesting correlations were observed to exist between effective project implementation and sound, state-of-the-art planning exhibited by the proposed land use concepts. In examining the impacts of the various productive land use plans on the overall process of implementation, 10 land use planning principles were identified as being indicators of project feasibility. The 10 planning principles listed in Table 8 represent good planning practice against which the corresponding features of proposed productive land use plans can be evaluated to point out plan deficiencies.

Table 8

#### Planning Principles for Disposal Site Productive Use Plans

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##### Relationship to Physical Surroundings

1. Compatibility with adjacent and surrounding land uses.
2. Utilization of existing transportation systems and infrastructure.
3. Utilization of waterfront location.
4. Compatibility with site size and configuration.
5. Site physical characteristics: planned use benefits versus development costs.

##### Relationship to Established Community Objectives, Plans, or Policies

1. Contribution to established community land use needs.
  2. Maintenance or enhancement of community image.
  3. Consistency with master plans.
  4. Provision of community benefits.
  5. Minimization of induced adverse impacts (traffic, spin-off development, etc.).
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159. The 10 planning principles were identified in case study research<sup>2</sup> as being either positively influential or problematic in gaining public acceptance of proposed land use plans. The process from project conception to final completion is almost always contingent on public endorsement and support, usually to a high degree. The 10 planning principles reflect those planning components that have recurring importance during productive land use plan preparation. For conceptual and evaluative purposes, the 10 principles are grouped into two categories: (a) those which relate the proposed land use plan to the physical surroundings and (b) those which relate the proposed land use plan to the objectives, plans, or policies established in the community.

160. Satisfying, or at least addressing, both groups of planning principles is important to the success of proposed productive land use plans. Productive land use plans that reflect the 10 planning principles can significantly enhance project acceptability and eventual operational viability. The 10 planning principles can be employed in the form of: (a) minimum planning practice guidelines for project sponsors or potential developers proposing a productive land use concept; (b) an internal Corps checklist for evaluating the features of proposed productive land use plans; and/or (c) a detailed Corps guidance memorandum for direct Corps involvement in productive land use planning. For a more detailed discussion of the 10 land use planning principles, the reader is again referred to the case studies project report.<sup>2</sup>

#### Implementation Factors for Disposal- Productive Use Projects

161. In the process of containment facility planning, from siting to eventual reuse, it is inevitable that a variety of specific issues will be raised by the many involved agencies and groups. Case study research under the DALU task identified nearly 40 types of issues, encompassing a wide range of concerns, having the potential to result in project delays.<sup>2</sup> Project implementation, however, is affected not only by specific issues raised by participants, but also by several

considerations not necessarily at issue.

162. To illustrate, consider that, on one hand, possible odor problems during disposal might be the basis for local resident opposition to a project. Resolution of the odor issue could delay the approval process. On the other hand, implementation difficulties might result from nonissue considerations such as participant attitudes, interagency coordination procedures, or a lack of technical coordination between disposal facility and productive land use planning.

163. In keeping with the concept of a systems approach to the planning of dredging-disposal-productive use projects, Corps and local sponsor planners should develop comprehensive strategies for plan implementation. Developed at the start of planning, these strategies should reflect, on a site-specific basis: (a) potential issues and agencies or groups likely to raise them; (b) physical features that can affect project feasibility; and (c) land use planning considerations. The list of implementation factors presented in Table 9 and discussed below provides a general framework for ensuring that project planners address the full range of substantive and procedural considerations that are important to successful project implementation.

Table 9

Implementation Factors for Disposal-Productive  
Use Projects

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Environmental

1. Ecological characteristics of proposed disposal area location.
2. Environmental impacts of disposal-productive use project.
3. Dredged material pollution properties.

Technical

1. Dredged material structural properties.
2. Disposal area subsurface conditions.
3. Disposal facility design and operating characteristics.
4. Site size and configuration (as related to productive use).
5. Technical coordination of disposal plan with productive use plan.

(Continued)

Table 9 (Concluded)

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Economic/Financial

1. Economic or social benefits (costs) of the disposal-productive use project.
2. Engineering and construction costs.
3. Dredged material transport costs.
4. Fees or taxes on dredged material.
5. Project sponsor capability to assume financial responsibilities.

Legal

1. Conformance with regulatory requirements.
2. Adequacy of environmental impact assessment or statement.
3. Disposal rights to the site.
4. Site ownership authorities (as related to productive use).
5. Land use restrictions.

Institutional

1. Public participation in disposal-productive use planning.
2. Coordination with project sponsor.
3. Coordination with review/regulatory agencies.
4. Coordination with planning agencies.
5. Procedures for identifying and resolving objections to the project.
6. Corps and other participant attitudes.
7. Political, business, and public support.

Planning/Implementation

1. Long-range Corps disposal planning.
2. Long-range waterway/environmental planning.
3. Dredging project specification.
4. Temporal coordination of disposal plan with productive use plan.
5. Availability of environmental data.
6. Evaluation of alternative disposal areas.
7. Impacts of disposal-productive use project on existing water uses.
8. Proposed use compatibility with adjacent land uses.
9. Proposed use compatibility with master plans.
10. Proposed use compatibility with available transportation systems and infrastructure.
11. Proposed site plan compatibility with site physical features and user requirements.
12. Commitment to proposed land use plan.

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Environmental factors

164. The important environmental considerations (apart from those of a legal nature) to be accounted for during project planning are:

(a) the ecological setting or characteristics of the proposed project; (b) the environmental impacts of the project; and (c) the pollution properties of the dredged material. With the exception of the added impacts of the proposed land use concept itself, the environmental implications of a disposal-productive use project are not substantively different from those of a disposal-only project. However, implementation delays resulting from environmental opposition to a disposal-productive use project can be more critical, particularly if delays are encountered after substantial investments of time and money have already been made. During early planning activities, both the environmental issues likely to be the basis for opposition to a project and the agencies or groups likely to raise the issues should be identified. Then, an overall implementation strategy can be formulated to deal with the issues before plans are finalized.

165. Interestingly enough, environmental impact factors can exert positive influences on implementation. For example, a proposed disposal area location of questionable ecological value (i.e., an area of previous fill activity) and a project design which minimizes overall environmental effects can, in combination, be an advantage in gaining acceptance for the project. This is particularly true when available alternative sites and/or designs involve relatively greater environmental disturbance. The implication is that disposal-productive use project planners, particularly within the Corps of Engineers, can aid implementation by viewing environmental factors from a wide perspective. Innovative implementation strategies (i.e., strategies that include early confrontation with opposition or use of the leverage that productive use projects provide when economic/environmental trade-offs are needed, etc.) can result.

#### Technical factors

166. Five types of technical considerations are important in disposal-productive use projects: (a) dredged material structural properties; (b) disposal area subsurface conditions; (c) disposal facility design and operating characteristics; (d) site size and configuration (as related to productive use); and (e) technical coordination of disposal plans with productive use plans.

167. Dredged material structural properties and disposal area subsurface conditions are factors to consider in terms of the foundation requirements of the disposal-productive use project. Foundation conditions at disposal sites are usually poor and must be compensated for through engineering, usually at substantial cost. Heavy industrial uses present the most difficult and costly foundation design problems. The predisposal subsurface conditions of an area affect both containment structure design and the foundation design of the proposed land use. The structural properties of the dredged sediments can affect disposal facility design by dictating the use of special dewatering techniques or perhaps by giving rise to a selective material placement scheme based on eventual bearing capacity needs. Naturally, it is preferable to simultaneously address the foundation needs of the disposal facility and the proposed land use in order to achieve any potential savings in foundation costs.

168. Disposal facility design and operating characteristics are an important technical factor because, if not addressed in terms of both disposal and productive use objectives, they can result in design inefficiencies. The design characteristics of the disposal facility are its capacity, size (acreage), and configuration. Providing sufficient disposal capacity for a specific project(s) over a certain time period is typically the overriding design consideration for disposal facilities. Site size and configuration are then tailored to meet the capacity constraint. When productive land use is involved, capacity can become a secondary design consideration to accommodate the proposed use because of land use functional needs, development economics, and development schedules.

169. The operating characteristics of the disposal facility primarily relate to overflow discharge quality. However, special operating features may be appropriate to enhance productive development (e.g., interior dikes to segment the material on the basis of structural properties). The probability of the facility design and operating characteristics serving to assist project implementation can be greatly increased through coordinated disposal and productive use planning.

170. Disposal site size and configuration (as related to productive use) is the most important technical factor for two reasons. First, as discussed above, the functional needs of the proposed use, such as site size and configuration, can have implications for the disposal capacity provided by the project. Second, the relationship between the size and shape of the disposal facility on one hand, and the needs of prospective site users on the other will (a) establish the site's "market value" to potential users, and (b) indicate the quality of land use planning practice applied to the project. Given the impact which disposal-productive use projects can have on adjacent land uses, and on communities as a whole, project implementation strategies should strive for maximum site/use compatibility.

171. Technical coordination of the disposal plan with the productive use plan is important to establish at the start of project planning. In a design sense, inadequate technical coordination can result in implementation delays while design deficiencies noted late in the planning process are remedied. In a construction sense, technical coordination is essential so that the needs of the site users are fulfilled. Technical coordination extends also to Corps disposal operations, which can be performed according to a developer's needs (e.g., selective material placement), provided that any added costs are assumed by the developer or project sponsor.

Economic and financial factors

172. Five economic and financial factors must be dealt with in disposal-productive use project planning: (a) economic or social benefits and costs; (b) engineering and construction costs; (c) dredged material transport costs; (d) fees or taxes on dredged material; and (e) sponsor capability to assume financial responsibilities.

173. Far and away the most important economic/financial factor to evaluate as part of an overall implementation strategy is the economic or social benefit (cost) of the disposal-productive use project. There are four reasons for the importance of this factor. First, overall community reactions to a proposed project can be determined by the project's relationship to community needs. Job-producing planned uses

in areas of depressed employment or recreational developments where such resources are deficient are more likely to gain approval than projects that appear to conflict with community needs. Second, economic or social benefits can assist in overcoming environmental opposition and in obtaining approvals from environmental agencies. Third, economic benefits can offset high engineering and construction costs associated with disposal facility and productive land use development. Fourth, trade-offs can be more easily made between the private benefits and the public costs of nonpublic land use concepts proposed for publicly owned tracts. It is clear that a complete demonstration of economic or social benefits is most often a powerful positive influence in disposal-productive use project implementation.

174. Engineering and construction costs for disposal-productive use projects, as for any civil works project, can be a most important factor. Coordinated disposal facility and productive land use planning can affect these costs in two basic ways. First, the foundation requirements of the proposed use may necessitate the use of special compaction equipment and/or building and road foundation designs. High foundation costs are typical, and early planning should investigate the sensitivity of the project economics to these costs and possible measures for reducing them. Second, the provision of utilities to a site, or construction of a retaining structure more suited to the proposed use, will invariably increase project costs. The magnitude of such costs, and the willingness to pay them, should be determined as soon as possible to avoid later implementation difficulties.

175. Dredged material transport costs are clearly a major factor in overall disposal project costs. It is not unusual for transport costs to be the telling factor in disposal site selection. For disposal-productive use projects, the possibility of the project sponsor or prospective site developer assuming any added transport costs is very real. Disposal options that might otherwise have been foreclosed may then be made available. An implementation strategy based on coordinated disposal and productive use planning can reduce the extent to which transport costs dictate the viability of disposal site alternatives.

176. Fees or taxes on dredged material are not likely to significantly affect implementation; however, prospective site users should be made aware of this potential cost early in project planning. This factor takes on greater importance as fill quantities increase. Project sponsor financial capabilities can be a significant delay-causing consideration when sponsor cost burdens are disputed or when needed funds are not readily available. Since Federal cost liabilities are limited to minimum disposal cost options, opportunities for facility designs that are more suited to eventual productive use can be lost if sponsors are unwilling or unable to pay the added expenses.

Legal factors

177. There are five legal factors to consider as part of an implementation strategy for disposal-productive use projects: (a) conformance with regulatory requirements; (b) adequacy of environmental assessment (EA) or EIS; (c) disposal rights to the site; (d) site ownership authorities (as related to productive use); and (e) land use restrictions. The first two legal factors are most important to project implementation since they have high potential for resulting in long-term delays.

178. Conformance with regulatory requirements during project planning and review is crucial since many times an interpretation of applicable requirements is involved prior to a particular course of action being taken. Most likely to be contested in litigation are Corps decisions that an EIS, public hearing, or state/local permit is not required. The adequacy of an EA or EIS is very likely to be questioned during disposal and disposal-productive use project environmental review. However, since it is difficult to establish in litigation that an EIS does not fulfill the requirements of the NEPA, EIS adequacy is not usually contested in litigation.

179. Disposal rights to the site are important primarily when the disposal-productive use project involves a relatively long active disposal period. As the elevation of the dredged material approaches developable levels, the attractiveness of the site for productive use increases. If development is feasible at an elevation lower than the

planned final elevation, the remaining disposal capacity can be forfeited in favor of productive use. This is particularly true in cases where no specific productive land use plan was prepared in conjunction with disposal planning. It is clearly in the best interests of the Corps to have firm and exclusive rights to use a disposal facility to its full capacity as planned.

180. Site ownership authorities (as related to productive use) can be an important implementation factor when the site is publicly owned. Opposition to the use of publicly owned material (i.e., the dredged sediments) to enhance a private productive land use development can be quite strong. To avoid implementation difficulties, initial project planning should include an analysis of potential constraints due to site ownership. Land use restrictions set down in local or state laws can present constraints on the types of land use concepts that are feasible for disposal facilities.

#### Institutional factors

181. The various participants in the planning and review process for disposal-productive use projects each have their own jurisdictions, authorities, responsibilities, policies, and procedures. The framework defined by the intra- and interrelations among the participants is the institutional setting within which projects are implemented. Important institutional factors of project implementation are: (a) public participation; (b) coordination with the project sponsors; (c) review/regulatory agencies; (d) land use planning agencies; (e) Corps procedures for identifying and resolving objections; (f) participant attitudes; and (g) political, business, and public-at-large support.

182. It is essential to the successful implementation of a disposal-productive use project that there be a high level of involvement and understanding by the agencies, governments, communities, and citizens affected by the project. Inadequate transfer of information among participants is likely to result in misconceptions, objections, and delays. Meeting "letter of the law" interagency coordination requirements, for example, may be adequate in one case but not in another if coordination is ineffective. For high visibility or interest projects,

failure to fully disclose project plans, alternatives, evaluations, etc., not only can lead to serious project delays, but also to an erosion of participant relationships. Overall, institutional factors are the most important factors affecting implementation.

183. Public participation in project planning at its early stages is as essential to plan implementation as frequent and effective coordination with project sponsors, review/regulatory agencies, and planning agencies. Failure to involve all concerned in early project planning can result in the late, and therefore untimely, identification of issues and objectives. The public at large, local residents, and cognizant agencies should be active participants and should not be viewed as outsiders who must be convinced of the worth of an already firm plan.

184. An integral part of coordination activities are the Corps' procedures for identifying and resolving objections. It is simply not good policy to use the Public Notice or draft EIS as the first step in public participation and/or interagency coordination. Failure on the part of the Corps to actively solicit official comments from principal participants (e.g., the Fish and Wildlife Service, Environmental Protection Agency) can lead to delays first in specifying points of argument and then in resolving differences. Local residents directly affected by a project should be among the first members of the public at large to be invited to participate in project planning and review.

185. Corps and other participant attitudes toward each other are an important institutional factor and can actually be the underlying cause of interagency coordination problems. The attitudes of Corps of Engineers project planners are especially important since their role is usually pivotal in disposal-productive use projects. Preformed opinions concerning the severity of or underlying reasons for opposition to a project can make resolution of issues very difficult. This is particularly true in the case of adjacent owners and residents, whose vested interests in properties near the proposed project must always be respected.

186. Political, business, and public support for the project can be an important positive implementation factor. Essentially, the level

of community-wide support for a project is determined by the extent to which the project meets community needs. For example, the favorable political aspects of a proposed labor-intensive industrial development can be a major factor in obtaining resolution of environmentally based objections. Project planners should be aware of the effects that community-wide support for (or opposition to) alternative proposed use plans can have on project implementation.

Planning and implementation factors

187. Factors relating to the overall process of planning and implementing disposal-productive use projects include several considerations representing project design, project review and evaluation, and land use planning. These factors are: (a) long-range Corps disposal planning; (b) long-range waterway/environmental planning; (c) project specification; (d) availability of environmental data; (e) evaluation of alternative disposal areas; (f) project impacts on existing water uses; (g) proposed use compatibility with adjacent land uses; (h) master plans; (i) available transportation systems and infrastructure; (j) site plan compatibility with site physical features and user requirements; and (k) commitment to the proposed land use plan.

188. Any dredging and disposal project should certainly be conceived in concert with both long-range Corps disposal plans and long-range waterway/environmental plans. For disposal-productive use projects this is especially true, particularly when the proposed use will result in an expansion of port-industrial activity or will generate spin-off development. Productive use plans should be developed in concert with long-range waterway development plans.

189. It almost goes without saying that dredging project specification should be achieved early in planning. Prospective developers of industrial, water-dependent land uses cannot be expected to commit to a proposed project if there is uncertainty as to the eventual shipping access characteristics of the site. Also, environmental review procedures, which are usually time-consuming, cannot be initiated until the basic details of the project are finalized.

190. The availability of environmental data is an important factor

to consider in terms of the project review and evaluation process. If project-specific environmental impacts cannot be reliably evaluated due to a lack of data, implementation delays could result while the needed data are developed. Early project planning can include an inventory of available environmental data, and actions to remedy deficiencies can be started soon enough to avoid or minimize implementation delays.

191. The evaluation of alternative disposal areas is obviously an important factor in disposal-productive use project planning. Strong opposition to a project can result if, in order to facilitate a productive land use plan, the disposal site is chosen over a more environmentally acceptable alternative. Conversely, the number of viable alternative disposal areas can be increased if a project sponsor or developer, in order to meet productive use objectives, is willing to assume any added costs incurred if high-cost disposal options are selected. When a new channel project is proposed, implementation can be assisted by jointly evaluating both the new work and maintenance disposal plans. Disposal-productive use project impacts on existing water uses, although not one of the more important factors affecting implementation, can be a useful input to the evaluation of alternatives. Existing uses such as recreational boating and fishing, public water supply, and industrial cooling and process water are of most significance.

192. Four very important implementation factors relating to good land use planning practice should be explicitly addressed in all disposal-productive use projects in which the Corps of Engineers becomes involved. Overall, proposed land use concepts that are similar to or compatible with existing adjacent land uses are much less likely to be opposed than those that represent dissimilar use. Similarly, compatibility with master plans can be a significant positive implementation factor. When proposed use compatibility with adjacent uses and master land use plans cannot be demonstrated, very strong opposition to the project is likely to materialize.

193. From a land use planning perspective, it is also essential that proposed use plans be compatible with available transportation systems and infrastructure. If possible, proposed land use concepts

should include maximum utilization of existing highways, railways, airport access, or shipping channels for goods movement. Also, the existence of infrastructure components such as water supply, sewage disposal, drainage, electricity, and gas service should be fully reflected in the designs. Proposed land use concepts that do not take advantage of such site amenities when they are available represent a less than optimal design concept. In locations where waterfront tracts having desirable features, such as rail access, are limited, productive use concepts that take advantage of such site features should be proposed.

194. The fourth implementation factor addressing land use planning is proposed site plan compatibility with site physical features and user requirements. The site plan for the proposed land use is the detailed plan indicating the location of roads, structures, bulkheads, etc., to be constructed on the filled site. A good site plan will utilize the site's physical features to the fullest in meeting the user's functional needs while simultaneously minimizing environmental impacts and effects on adjacent land uses. The preparation of site plans is, of course, the responsibility of either the project sponsor, the site owner, or the proposed developer. However, Corps of Engineers planners should be sensitive to the importance of maximum site plan compatibility with site physical features and user requirements.

195. The last implementation factor related to the overall planning and development process is the level of commitment to the proposed land use plan. A firm commitment to the proposed use plan is an important part of project implementation for three reasons. First, in many cases, the approval of environmental review/regulatory agencies can be conditioned upon such a commitment. Second, disposal facility design and construction can be closely coordinated with the proposed use plan if it is certain that the plan will, in fact, be effected. Finally, Corps of Engineers credibility dictates that Corps project planners not become vulnerable to criticism for participating in a project proposed for one land use concept and then developed for another.

PART VII: POLICY AND PLANNING ISSUES AFFECTING THE  
LAND USE OF DREDGED MATERIAL CONTAINMENT AREAS

196. It is difficult to dispute the contention that improvements are needed in the planning processes for water and related land resource development. It is even more difficult to specify and reach agreement on what should actually be done to improve the planning process. For the special case of multiobjective projects involving dredged material disposal and subsequent disposal site development for productive land use, the planning process has been evaluated in great detail under the DALU task of the DMRP. A number of policy and planning issues that are important for successful implementation of disposal-productive use projects have been identified.

197. The following discussion of these issues is oriented toward Corps policy and planning personnel. But for Corps policymakers and planners, it is most important to recognize that overall planning policies and approaches that encourage the use of dredged material as a resource must be developed for implementation by management personnel. The basic components of the essential overall policy and planning approach for dredged material productive use are presented in the sections below.

Policy and Planning Issues

198. Environmental restrictions, modified water resource development objectives, and a commitment to use dredged material as a manageable resource are causing changes in the manner in which the Corps conducts dredging and disposal operations. The planning and development of multiobjective projects, such as disposal-productive use projects, are typically complex undertakings. In the past, faced with the basic problem of providing sufficient confined disposal capacity, Corps and project sponsor planners rarely participated in planning for the productive use of the completed sites.

199. If the Corps is to assume a more active role in

disposal-productive use planning, a number of basic issues and institutional questions must first be resolved at Corps planning and policy development levels. Table 10 lists those critical policy and planning issues associated with the development of disposal-productive land use alternatives for dredged material disposal.

Table 10

Policy and Planning Issues Associated with  
Disposal-Productive Land Use Alternatives

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Policy Issues

1. Corps advocacy role in disposal-productive use planning.
2. Corps advisory role in disposal-productive use planning.
3. Evaluation criteria for disposal-productive use alternatives.
4. Financing of disposal-productive use projects.
5. Application of the "Principles and Standards" and Corps multi-objective planning procedures to disposal-productive land use planning.
6. Expansion of Corps' role in Corps-sponsor relationships for operations and management.
7. Legislative recognition of disposal-productive use concepts.

Planning Issues

1. A multidisciplinary team approach to disposal planning by the Corps' District offices.
  2. Encourage more cooperative interagency/intergroup participation in planning disposal-productive use options.
  3. Development and application of a holistic or systems approach to dredging-disposal-productive land use project planning.
  4. Establishment of long-term comprehensive regional plans for dredged material disposal-productive use alternatives.
  5. Development of land use planning expertise within the Corps.
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Policy Issues

Corps advocacy role

200. Prime ingredients in planning for the productive land use of dredged material containment areas are a positive attitude and commitment to the concept. The Corps' role as an advocate of disposal planning is a central one and should not be viewed otherwise. Since the

disposal-productive use concept is new and unusual, there is the need for the Corps or some other group to take the initiative in promoting the idea and stimulating public awareness of its benefit potential. For example, an active advocacy role on the part of the Corps in recreational land development and land use in association with navigation projects would appear warranted. DMRP studies have documented a need for additional recreational space near urban areas and the capability to satisfy part of this need through the recreational use of dredged material disposal sites.<sup>3</sup> However, with only a few exceptions, the Corps does not have the authority to actively engage in site development for this purpose without equal participation by non-Federal interests.\* A lead advocacy role by the Corps could stimulate the necessary coordination, planning, adherence to environmental protection standards, and resolution of sociopolitical issues likely to arise.

201. The likelihood of disposal-productive use concepts being designed and implemented is greatly enhanced where there is a firm resolve to promote or encourage the concept on the part of the Corps. Indeed the DALU task has been a positive factor in advertising the disposal-productive use concept and moderating apprehension by pointing out where others have applied it successfully.<sup>1,2,5</sup> In addition to asking, "How do we get rid of this stuff?", Corps and local sponsor planners/engineers should consider "When, where, and how can we utilize this resource?"

202. Of course, it will be impossible to identify and implement productive use alternatives in all cases, but this report and others produced under the DALU task provide guidance for evaluating disposal-productive use project potentials. To be sure, however, where there is no commitment to address the possibility of productive use alternatives at the start of disposal planning, there is little hope for such alternatives to be realized. Increased perception, both inside and outside the

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\* The Federal Water Project Recreation Act of 1965 (Public Law 89-72) requires non-Federal interests to share, on an equal basis with the Federal Government, all incremental costs associated with recreational development at Corps projects.

Corps, of dredged material as a useful resource is essential if disposal-productive use concepts are to provide relief from rising disposal pressures.

Corps advisory role

203. Within the existing dredged material disposal planning system, the Corps of Engineers should actively participate in disposal planning involving productive land use concepts for containment areas. As illustrated in the DALU case study report,<sup>2</sup> there are several possible scenarios in which disposal-productive use projects can be planned. Active Corps involvement is most appropriate during the planning of new containment facilities for Federal dredging projects but is also appropriate during planning for the productive development of active containment sites. For disposal alternatives arising from the preconceived development plans of a project sponsor, the appropriate Corps role is more passive, consisting essentially of land use plan review by Corps planners to avoid association with poorly planned land use projects. Even when the Corps' role is passive, the public usually perceives the Corps' role as more extensive, and thus holds the Corps responsible for deficiencies in the land use plan.

204. The development of site-specific land use plans is clearly not within the Corps' mission. However, the use of dredged material as a resource is well within the Corps' obligation to consider among all disposal alternatives. Due to their unique experience and capability, Corps personnel are in an excellent position to offer assistance on the engineering, environmental, and planning aspects of creating land with dredged material. Thus, a technical advisory role appears to be the most appropriate way for the Corps to meet its navigable waterway maintenance obligations and resolve attendant dredged material disposal issues.

205. There are several reasons for more direct Corps involvement, as a central technical advisor, in productive land use planning. First, the productive development of dredged material containment areas can have significant impacts on adjacent land uses and, in some cases, on the land use trends of a substantial area. As the Nation's prime mover

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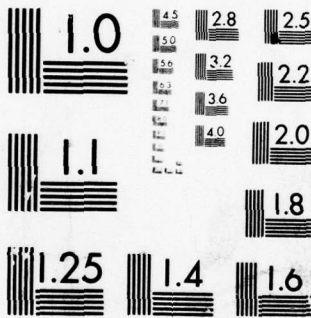
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of dredged material, the Corps has a lead role in projects resulting in land creation. It is absolutely essential that the interests of adjacent landowners, the community as a whole, and the "public interest" be reflected in the ultimate disposition of that land.

206. Second, since dredged material disposal pressures are intense and getting more so, it is important for the Corps and local project sponsors to be capable of systematically taking advantage of all planning scenarios that can increase available disposal capacity. Proposed productive land uses that help fulfill the land use needs of communities will enhance the overall acceptability of proposed disposal plans, thereby assisting implementation and, possibly, providing disposal capacity that might not otherwise have been available.

207. Third, the existing Corps disposal planning system includes policies and procedures for site evaluation and selection, interagency coordination, public involvement, etc. This system provides an excellent framework for achieving a high degree of coordination between disposal facility and productive land use planning. Such coordination will enhance the feasibility and ultimate viability of the selected productive land use concept. Additionally, the successful implementation of productive use concepts for confined disposal sites will assuage the public relations problems associated with abandoned, unused disposal areas.

#### Evaluation criteria

208. The U. S. Water Resources Council's "Principles and Standards for Planning Water and Related Land Resources" (September 1973)<sup>32</sup> recognizes the importance of evaluating water and related land resource plans against multiple objectives. Disposal planning procedures for dredged material have traditionally required selection of the "least-cost" alternative. The "costs" associated with disposal alternatives have been narrowly defined, and, generally, only tangible dollar costs have been considered. There has been little concern with the ultimate use of the disposal site, nor has there been an accounting of the benefits such use would generate.

209. Current Corps policy allows only limited inclusion of land enhancement benefits from containment area land use into the evaluation

of alternatives for dredged material disposal. This constraint reduces the ability of a productive land use alternative to compete against conventional disposal options. Also, the short-range nature of disposal planning biases decisions in favor of conventional disposal. The long-term disposal option should be included in alternative evaluations. The need for long-term planning is discussed below under "Planning Issues."

210. Policy modifications are needed to change present evaluation criteria and guidelines so that productive land use plans can be compared on a fairer basis with conventional disposal plans. A fundamental policy question to be resolved is whether the productive use of dredged material from both new work and maintenance projects should become a recognized and authorized component of Federal navigation projects. This change in perspective would be in keeping with the systems approach to disposal planning which is also addressed under "Planning Issues." Specific guidance is needed on the status of productive land use options as an alternative for dredged material disposal.

#### Project financing

211. A serious constraint on the use of dredged material as a resource is the national policy that requires local project sponsors to select, finance, and construct dredged material containment areas. Coordination of disposal facility and productive land use planning implies the selection of disposal alternatives that go beyond least-cost options. But implementation of concepts of extended-life disposal sites and productive uses of dredged material is severely limited or precluded under the financial capabilities of most project sponsors. Thus, disposal-productive use projects are constrained by the capability and willingness of project sponsors to assume the incremental costs associated with facility designs more suited to proposed productive land use concepts. Lack of financing resources in local communities was found to be the major constraint to the development of recreation land from dredged material in urban areas.<sup>3</sup> Conversely, more than adequate financing by proposed site developers was found to enable the creation of industrial land in several cases.<sup>2</sup>

212. On the Corps' side of the financial issue is the lack of a

Corps policy in seeking and using additional project funds for the often incommensurable social and environmental benefits. The variety of technically feasible productive uses of confined disposal facilities will be initially and/or subsequently more expensive in most cases than the least-cost alternative. This may be due to a need for longer-than-normal transportation and/or processing or dewatering. However, presently there does not appear to be an effective way for the Corps to use the incommensurable social and/or environmental protection and enhancement benefits in the traditional benefit-cost ratio analysis, or the more recent "Principles and Standards" net economic development benefits analysis, to the extent it can be justification for higher costs. The problem is further complicated when a private owner or state or local governmental unit is the primary beneficiary. This seemingly limiting aspect of the productive use of disposal sites requires policy-level evaluation.

213. The Corps' authority to expend public funds for disposal activities--to include consideration of incommensurable benefits--should be extended to enable the development and selection of facility designs that reflect the productive use objective. Further study is needed to evaluate alternative policies for Federal financial support to enhance productive land use feasibility. Perhaps demonstration funds should be made available in order that the disposal-productive use option receive more widespread consideration. Recent legislation has provided funds for marsh habitat creation projects.\* Productive land use projects are no less deserving.

"Principles and Standards"  
and Corps multiobjective planning

214. Existing Corps policies, procedures, rules, and regulations developed in response to the "Principles and Standards" establish the framework within which multiobjective Corps projects must be planned. This framework is now being used in the planning of water resource projects, including new work dredging. Maintenance dredging projects,

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\* Sec. 150, Water Resources Development Act of 1968 (Public Law 94-587).

however, are not presently being evaluated under the "Principles and Standards."

215. The Corps should stress the application of the multiobjective planning guidance to dredging-disposal-productive use projects. One of the main advantages of using this planning approach is that it requires the planner to consider a wider range of alternatives, especially in the early planning stages. In evaluating this wider range of alternatives with disposal sites as the planning objective, combined disposal-productive use alternatives are more likely to be assessed.

216. Another plus under the Corps' multiobjective planning guidance is that an open planning process is encouraged, one in which every agency, group, individual, etc., has a forum to express their ideas. An open planning process is essential for disposal-productive land use projects, which by their very nature can have a significant impact on adjacent properties or the local community. The Corps' policy should be one of full disclosure of all relevant facts during the earliest stages of the planning process. Cognizant review agencies and the affected public are not likely to be persuaded of the desirability of a plan at the eleventh hour. Rather, they should be involved in plan development and review from the start. Decisions concerning dredged material disposal must reflect public needs and desires; there is little chance for a successful disposal-productive land use project without public approval and support early on in the planning process.

Expansion of the Corps' role  
in Corps-sponsor responsibilities

217. Most of the disposal-productive use alternatives examined under the DMRP and in various District-level studies require increased activity in planning, engineering, and site management. Again, although the Corps may be in the best position to provide the knowledge and manpower needed to implement disposal-productive use alternatives, the local project sponsor is normally responsible for obtaining, constructing, operating, and maintaining required confined disposal areas. Although the advantages of this arrangement to the Corps are apparent, there are certainly situations where the Corps incurs direct and indirect

added project costs, blame by the public for accidents and undesirable situations, and difficulty in carrying out its obligation of reasonably minimizing adverse environmental impacts. Unfortunately, most project sponsors today would be overwhelmed by the technical and financial problems that must be addressed in disposal-productive use planning. Most sponsors have neither the staff nor the experience to conduct the needed interdisciplinary planning. Thus, there is a void where the assumption of greater responsibility for design, operation, and management of disposal-productive land use sites must be effected to accomplish disposal-productive use concepts. The Corps, with its considerable technical expertise in disposal operations, could serve as the central coordinating agency for project design and analysis activities, as well as the overall technical advisor to sponsors, developers, and review agencies. Such major expansion of the Corps' role would require broad policy-level evaluation and significant modification to present authorities.

#### Legislative recognition

218. The disposal needs of the Corps require execution of long-term site use agreements or purchase of several thousands of acres each year. However, the inventory of available land for disposal is steadily diminishing due to expanding urbanization and the popular interest in preventing further reductions in wetlands, water surface area, and productive upland and lowland areas. The disparity between Corps disposal needs and land availability has made acquisition of new disposal sites increasingly difficult. Elimination of this disparity could be accomplished by legislatively recognizing disposal-productive land use as a legitimate objective within the Corps' national dredging program. The major advantage to the Corps of such recognition would be an increased availability of land for disposal easement. Use of the land is more likely to be favorably considered if some benefit can be derived from it rather than relegating it solely to a form of waste disposal.

219. The existing Corps permit power, which has been guided by concern for the preservation and enhancement of the public interest, provides the basic building block upon which future policy could be

molded. Suitable precedents have been established where, with the appropriate recasting, they could provide the stimuli for a Corps disposal-productive land use policy. For example:

- a. The RHFCA recognized that certain conditions necessitate confined disposal, and for the first time Congress conditioned that need with the stipulation that a subsequent end use be "satisfactory to the Secretary of the Army."
- b. Multipurpose water resource projects have become the norm, e.g., recreation\* and flood control are valid purposes in the construction of such projects, whereas no such encouragement exists for the disposal-productive use concept as an adjunct on Federal navigation projects. Section 150 of the Water Resource Development Act of 1976 (WRDA) authorized the planning and establishment of the areas as part of the authorized water resources development projects. The same recognition of DALU concepts is needed.
- c. Congress has recognized the increasing need for new disposal areas and thus has encouraged ". . . the authorization of such management practices as the Secretary of the Army acting through the Chief of Engineers determines appropriate to extend the capacity and useful life of dredged material disposal areas . . ." (Section 148, WRDA). Where new disposal sites must be established, legislative support for DALU concepts as part of total project planning would ease site acquisition pressures.

220. The Council on Environmental Quality has observed a growing consensus that land use is probably the most important single factor in improving the environment of the United States. If it can be agreed that land use control is the "most important single factor," it is ironic that it still remains substantially unaddressed as a matter of national policy. There can be no argument that the environmental movement has influenced judicial opinion, setting statutory and administrative controls, regulations, principles, and guidelines. But critical navigation projects--halted or threatened with termination because of environmental opposition or apparent economic infeasibility--must be allowed to proceed. Land control legislation that superimposes more comprehensive land use perspectives upon all levels of government in

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\* See Sjkei's discussion of The Federal Water Project Recreation Act of 1965 (Public Law 89-72).<sup>3</sup>

making many environmentally critical decisions should assist in avoiding protracted delays. Appropriate recognition and authorization of subsequent end uses of disposal sites as part of a national land use policy or as a legitimate objective of Corps navigation activities would encourage opportunities to evaluate fully the projected effects and trade-offs of alternative plans in disposal planning.

#### Planning Issues

##### Corps multi-disciplinary team approach

221. Case study research under the DALU task<sup>2</sup> has shown that, in most instances, the responsibility for Corps coordination with local sponsors during disposal planning lies with the Operations and, to a lesser extent, Engineering Divisions in Corps Districts. In effect, the burden of the entire planning process for disposal options is usually left to an Operations engineer. Although qualified to perform engineering work associated with disposal planning, the Operations engineer is not qualified to deal with the many diffuse issues that can rise among competing interests during disposal-productive use project planning. In fact, no professional discipline is sufficiently diverse to singly address the issues associated with disposal area productive use.<sup>2</sup> Such issues are best dealt with by way of joint ventures among the Operations, the Engineering, and the Planning Divisions. In essence, a multidisciplinary planning approach within the Corps is needed.

222. District Planning Divisions should assume an active role in planning, implementing, and managing both new work and maintenance dredging projects and associated disposal-productive land use concepts. Full interaction and cooperation among Planning, Operations, and Engineering are necessary to comprehensively assess productive land use options for disposal. The potential obstacles to disposal-productive land use project success are numerous. Many of these obstacles are faced commonly during conventional disposal planning, but others are uniquely related to productive land use planning. Interdisciplinary planning teams within the Corps are needed to anticipate and effectively meet the special

planning requirements of disposal-productive use projects.

Interagency and  
intergroup participation

223. Complementing the Corps' internal coordination for multi-objective disposal planning should be a significant effort to obtain constructive planning participation from Federal and state agencies as well as the public, both at large and adjacent to a proposed site. Existing Corps interagency coordination policies should be expanded to ensure that the disposal-productive use planning exercise receives timely input from state, regional, and local planning agencies. An obvious, but sometimes overlooked, prerequisite for project success is consistency with applicable land use plans and policies.

224. Under existing procedures, the public is typically not involved in project planning and review until advanced stages of the implementation process. In instances where public opposition is subsequently encountered, significant project delays can result after most other concerns have been resolved. When public opposition is from adjacent landholders who were unaware of a project being planned in their area, a climate of misunderstanding and distrust can develop to the point of overshadowing more rational and important concerns. The appearance of a closed-door Corps planning process should certainly be avoided in any case, especially in the eyes of the local public directly impacted by a disposal-productive use project.

225. The public at large, local residents, and cognizant agencies should be active participants and should not be viewed as outsiders to eventually be convinced of the worth of an already firm plan. Public and planning agency involvement in Corps planning efforts, or in planning efforts significantly dependent on the Corps' dredging/disposal activities, should not be left up to local project sponsors. Instead, it should be handled directly by members of a Corps interdisciplinary planning team.

Systems approach

226. It cannot be overemphasized that for effective planning the dredging-disposal-productive use components of a navigation project must

be thought of as one complete system. The feasibility and operational viability of a productive land use concept can be greatly affected by choices in candidate site selection and by decisions made during the development of the dredging and disposal specifications. To optimize the functional capabilities of the proposed use, disposal facility and productive land use planning should be undertaken as a single, coordinated effort whenever possible. This would enable programmed land use needs to be considered early, thereby affording disposal facility designs, including configurations, more suited to the proposed use. Also, disposal operations could then be conducted to account for the needs of the proposed development, enhancing project feasibility and perhaps reducing development costs.

Long-term, regional,  
and comprehensive plans

227. In keeping with recent legislative and regulatory actions described in Part V of this report, the Corps, in conjunction with other Federal, state, and local agencies, should develop dredged material disposal plans that are long-term, regional, and comprehensive in scope and that address alternatives for containment area productive use. Such planning efforts are no longer idealistic goals but are now required by legislation such as the CZMA. Long-term plans are essential for disposal-productive land use options because of the long lead time required to plan, design, and develop land use alternatives. Also, long-range planning allows a more systematic and careful analysis of all alternatives. But again, funding is a limitation.

228. Funding limitations may adversely impact on advanced construction and long-range developmental activities. In many instances, the long-term performance of containment areas may be improved significantly through the application of improved design and construction techniques. However, such techniques often involve higher initial costs although future maintenance project costs will be reduced directly and indirectly. A conflict hence develops when Corps Districts are limited to options that involve least initial costs. Long-range developmental activities or phased construction presents similar problems in that

neither can normally compete successfully under the various pressures and influences on the use of Operations and Maintenance funds.

229. Regional plans should be developed to ensure that the best overall sites are selected on an area-wide basis. A better allocation of coastal and inland land and water resources is possible when competing uses are satisfied on a regional basis. Containment facility productive land use plans should be included as part of comprehensive development plans for state and local areas. The land, shoreline, or open-water areas required for containment facility siting should be evaluated against all other competing land uses planned for these coastal or riverine areas. The potential to utilize dredged material to help fulfill the waterfront land use needs of communities should be thoroughly investigated. Proper conjunctive planning and coordination among the Corps and other Federal, state, and local groups is needed to develop the necessary long-term regional, comprehensive plans. Some excellent examples of this already exist for reference.<sup>1\*</sup>

Corps land use planning expertise

230. At the present time, Corps and project sponsor disposal planners do not systematically address wide-ranging land use planning considerations during disposal-productive use project planning and review. A basic deficiency noted during the DALU case study research<sup>2</sup> was the lack of involvement of Corps land use and water resource planning expertise in disposal planning activities. It is therefore recommended that Corps disposal planning staffs include an experienced land use planning professional. This will enable land use planning considerations to be addressed as part of a coordinated disposal-productive use planning process. The land use planner, operating in conformance with Corps regulations, would play the role of key liaison among the Corps, project sponsors, site developers, and cognizant planning agencies. The Corps planner would provide important insights regarding alternative disposal areas and site designs, reflecting the "public interest" in types of water-related land uses in demand by the community and assuring plan compatibility with state and local land use plans.

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\* Coos Bay, Oreg., and Rotterdam, The Netherlands.

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APPENDIX A: TASK 5D RESEARCH REPORT ABSTRACTS

Work Unit No. 5D01--Socioeconomic Aspects of Dredged Material Disposal: The Creation of Recreation Land in Urban Areas  
(Contract Report D-76-6)

This report analyzes the factors which would constrain the creation of shoreline or offshore recreational land from dredged material. It presents and evaluates the legal, institutional, sociological, and economic factors affecting the recreational use of dredged material disposal sites. A strategy is advanced for coordinating the dredged material disposal activities of Districts with the recreational needs of urban areas. The major findings of this research are as follows. First, dredged material can be used in an economically efficient manner to create recreational land in urban areas. The existing need for recreational facilities, the increasing quantities of leisure time, and the changing utilization of it suggest that the benefits from the recreational use of dredged material disposal sites can be substantial. Second, environmental concerns are not an insurmountable barrier to the creation of recreational land from dredged material. Third, the financial resources available to local communities to develop the recreational potential of disposal sites may be a very important constraint. Fourth, the initiative and attitude taken by Corps of Engineer Districts to the idea will determine in many cases the extent to which it is implemented. Fifth, not every community will be able to benefit from the recreational use of dredged material nor will all Districts be able to implement the idea to the same extent.

Work Unit No. 5D02--Case Studies and Comparative Analyses  
of Issues Associated with Productive Land Use  
at Dredged Material Disposal Sites  
(Technical Report D-77-43)

An important use of dredged material as a manageable resource occurs when confined disposal sites are developed for productive land use purposes. This study involved the documentation and comparative evaluation of 12 selected cases where dredged material from navigation projects was used to create productive land. The 12 case studies were prepared to examine multiobjective disposal-productive use planning in terms of:

- a. The sequence of events comprising the planning and implementation process.
- b. Participants in project planning/review and their roles, perspectives, and interactions.
- c. Issues addressed during project planning/review, their importance, and how they were resolved.
- d. Physical planning elements affecting the feasibility of disposal facility and productive land use plans.
- e. Land use planning principles that should be reflected in proposed productive use concepts.

The results of this study are directly applicable as a management aid for Corps disposal planners. The principal output of the study was the development of an overall set of "implementation factors" for disposal-productive use projects. Thirty-seven factors were identified and categorized as environmental, technical, economic/financial, legal, institutional, or planning/implementation. These factors provide a framework for ensuring that project planners address the full range of substantive and procedural considerations that are important to successful project implementation.

The set of implementation factors is actually a distillation of intermediate project findings in three areas. First a checklist of issues associated with disposal facility planning (from siting to reuse) was generated, encompassing a wide range of concerns having the potential to lead to project delays. Second, the important physical elements

affecting both disposal facility and productive use planning were identified. The elements provide a planning tool for using physical characteristics to enhance project feasibility and public acceptance, to maximize site utility, and to coordinate disposal-productive use planning from a technical viewpoint. Third, 10 land use planning principles for disposal land use projects were identified. The principles serve as indicators of project feasibility and represent good planning practice against which the corresponding features of proposed productive land use plans can be evaluated to point out plan deficiencies.

The 12 case studies provide documented proof that disposal-productive use project success is as much affected by procedural factors as by substantive factors. The procedural aspects of each case study are fully delineated in individual case study synopses contained in Volume II of the study report. The detailed comparative analyses of the 12 cases, which led to the identification of the important implementation factors, are also provided in Volume II. The matrix approach used in this study enabled the site-specific nature of disposal planning to be retained in the analysis while providing a common basis for comparison. As a result, the set of implementation factors is applicable to all disposal planning situations.

Work Unit No. 5D03--Land Use of Dredged Material  
Containment Areas: Productive Use Examples  
(Miscellaneous Paper D-78-4)

The study documents examples of productive land use of dredged material containment areas. The examples were obtained from published literature and project descriptions and discussions with persons knowledgeable in the planning and execution of dredging projects. The examples are from 19 states and 6 foreign countries. The sites range from those filled over 50 years ago which have been used productively for many years to projects in various stages of development. Projects are documented within the following land use categories: recreational, industrial/commercial, agricultural, institutional, material transfer, waterway-related, and multiple-purpose.

Based on the examples cited and information analyzed during the study, the site selection process is discussed from historical and modern perspectives. Examples of recent processes and approaches to candidate site selection implemented by communities in the United States and abroad are described.

Productive land uses tend to fall within a hierarchy of complexity and intensity. It is suggested that this hierarchy is accompanied by a need on the part of the sponsor or developer to recognize and deal with a greater number of planning conditions to achieve a greater land use intensity. These planning conditions are interrelated to several identifiable planning actions which if properly undertaken can significantly enhance the productive use of the landform created at the disposal site.

Finally, the study draws conclusions concerning the quality and quantity of literature available on productive land use and the potential for achieving productive land use on dredged material. Identified as a major institutional factor limiting productive use of dredged material is the division of responsibility between Federal, state, and local governments regarding navigation, environmental protection, and land use. Multiobjective land use planning is proposed as a means of accommodating these and many other vested interests which will impact

to varying degrees on the objective of placing dredged material where it can be used productively.

Work Unit No. 5D04--Evaluation of Laws and Regulations Impacting  
the Land Use of Dredged Material Containment Areas  
(Technical Report D-78-55)

The principal areas of investigation were those laws and regulations of Federal, state, or local origin which have the effect of encouraging productive end uses of new land created by the confined disposal of dredged material produced by navigation channel improvement projects. A search was made for all Federal laws and regulations and the laws of the 16 states in which most confined disposal activities take place. The charters and regulations issued by port districts or port authorities in the 16 states were also reviewed.

All laws and regulations that were found that could have an impact on land use decisions, including procedures for preparation and review of environmental impact assessments, are summarized in this report. The most restrictive provisions were incorporated into a series of scenarios for the application of permits to make productive use of filled dredged material containment areas, and these were analyzed to assist in the development of strategies for overcoming the legal constraints on end use of this land.

All of the provisions in the law that tend to promote productive use of land created by dredge-fill operations are summarized, and these were used in structuring the viable strategies for overcoming constraints noted in other jurisdictions. The conclusions and recommendations include approaches to the incorporation of a dredged material containment area "location and end use" element in the Level A, B, and C plans for river basin produced under the Federal Water Pollution Control Act 1972 Amendments and the 1965 Water Resources Planning Act. This section of the report includes guidelines for the preparation of a model statute that might be sponsored by the Corps of Engineers which, if enacted by the states in which confined disposal is practiced, would provide for coordinated multiagency processing of land use applications and would provide other incentives for productive use of all land created by the dredge-fill operations of the Corps of Engineers.

Work Unit No. 5D05--A Methodology for Determining  
Land Value and Associated Benefits Created  
from Dredged Material Containment  
(Technical Report D-78-19)

This report presents a step-by-step methodology for determining land values and associated benefits from the productive use of dredged material containment sites. A discussion of productive uses of dredged material sites, their physical characteristics, institutional and legal constraints, and local land demand is included, as well as an overview of property valuation.

The methodology is presented and discussed in terms of such parameters as site description, establishment of use potential, value estimation, and associated benefits and impacts. Working tables are presented. The resulting land value and the associated benefits and impacts created by dredged material containment should be explicit inputs to the formulation of plans in accordance with "Principles and Standards for Planning Water and Related Land Resources," and Corps of Engineers regulations.

Fifteen case studies of productively used dredged material containment sites were conducted to validate and refine the methodology. One of the case studies was used as a site-specific example of how the methodology can be applied. All 15 case studies (Appendices A-0) were reproduced on microfiche and are included in the report.

**APPENDIX B: EXAMPLE OF STATE LAW MATRIX**

**FLORIDA**

	(A)	(B)	(C)	(D)	(F)	(F)	(G)
	Title of State Law and Code Section	Administrative Agency	Basic Authorities of Administrative Agency	Physical Area of Authority	Application of This Law to the Land Use of Containment Areas	Specific Mention of Dredge and Fill Activities	Exemption Provided for Corp. Use
Laws Directed at Environmental Protection							
(a) Wetlands Protection Laws (include Shoreline or Coastal and Fresh Water Wetlands Laws)	No pertinent laws found under this sub-category.						
(b) Water Quality Laws	Air & Water Pollution Control Act, Fla. Statutes Ch. 403 (1975).	Department of Environmental Regulation (DER)	This act gives the DER many authorities over several environmental areas. One authority involves control over dredging & filling to protect water quality.	No specific geographical area; some authority over all of state.	The regulations issued by the DER require permits for activities involving dredging & filling. The applications must specify expected uses, and uses which may impair water quality presumably will not be allowed.	Yes - in regulations associated with this act dredge & fill activities are specifically mentioned.	No
(c) Wild & Scenic River System Laws	No pertinent laws found under this sub-category.						
(d) Wild Lands Protection or Land Conservation Laws	No pertinent laws found under this sub-category.						
(e) Fish & Game Habitat Protection Laws	Fla. Aquatic Preserve Act, Fla. Statutes §§258.35-258.46 (1975).	Departments of Natural Resources & Environmental Regulation	To approve dredging or filling activities, mining activities and the erection of structures and to regulate other activity within the preserve.	Authority under the act encompasses only state-owned land or waterbottom designated as aquatic preserves.	Land use of a containment area would be restricted if located within a designated aquatic preserve area.	No	No mention of federal activity.
(f) Environmental Impact Assessment Laws	No pertinent laws found under this sub-category.						
Laws Directed at Land Use Control							
(a) State Land Use and Land Use Planning Laws	Fla. Environmental Land & Water Management Act, Fla. Statutes Ch. 72-371 §§380.012 et seq. (1972).	Department of Administration, Division of State Planning	To designate land as an area of "critical state concern" & to regulate uses on such land.	Designated areas up to 5% of total Florida land area.	Uses in designated areas must conform to the regulations issued concerning uses of this land.	No	No. U.S. Government agencies are specifically mentioned as included as persons subject to the act.
	Regional Development Law (this law is part of the above Act) (1972).	Department of Administration, Division of State Planning	To determine which developments may have a "regional impact" & require a review procedure for such developments.	Any lands being developed with a project which has regional impact.	If containment area use is determined to have regional impact, local agencies are required to consider certain impacts prior to approval.	No	No. U.S. Government agencies are specifically mentioned as included as persons subject to the act.
	Local Government Comprehensive Planning Act, Fla. Statutes Ch. 163 §§163.3161 et seq. (1975).	Department of Natural Resources, Division of Resource Management	Local governments are to develop a plan in conjunction with the state & regional plans above. Both the state & regional agency have authority to recommend additions to the local plan prior to adoption.	Local governments have authority over all land under their jurisdiction.	Uses must conform to the local land-use plan.	No	No. U.S. Government agencies are specifically mentioned as included as persons subject to the act.

Taken from Science Applications, Inc. 4

(H)	(I)	(J)	(K)	(L)
Types of Uses Encouraged or Discouraged by the Act	Requires Permits	Specific Permit Procedure	Allows Waivers or Variances	Interaction of This Act with Other State and/or Local Authority
which have a possible detrimental effect on air quality would be subject to the control of and conditions imposed by the act.	Yes	Yes - in regulations.	No	Local agency approval must be obtained prior to permit application to the state, but final permit approval is given by the state.
if uses not inconsistent with lawful uses such as sport and commercial fishing, boating and swimming are encouraged.	Yes	No specific mention.	No	This act applies to state-owned land, local agencies have no authority over this land.
areas designated which have environmental significance; contain archaeological, historical or other natural resources; and which are affected by or have a significant impact upon major public facilities. Such uses which derogate from above interests are restricted.	Yes	No	No. Waivers or variances to regulation of land use are not specifically mentioned.	Local governments may request designation of an area, or the state may act alone. The locals may also regulate the area but this is subject to state approval. Local areas may also enforce. The state will enforce if local governments do not.
developments with regional impacts are subject to review similar to an environmental impact statement and presumably uses with significant impacts are restricted.	Yes. Permits are required at the local level not by the state agency.	No	No	Local governments are required to consider the impacts before allowing the development. The act does not specify state authority to overrule local approval of a development; only that locals must consider certain impacts.
which lead to a balanced future economic, social, physical, environmental and development of areas are encouraged.	Yes	No	Local variances in zoning regulations included in the plan may be allowed.	Regional & the state agencies make recommendations and additions to the local plan but there is no mention of state enforcement of the plans.

	(A)	(B)	(C)	(D)	(E)	(F)	(G)
FLORIDA (Continued) Laws Directed at Land Use Control	Title of State Law and Code Section	Administrative Agency	Basic Authorities of Administrative Agency	Physical Area of Authority	Application of This Law to the Land Use of Containment Areas	Specific Mention of Dredge and Fill Activities	Exemption Provided for Corps Use
(b) Public Land Laws Controlling State Owner Lands or Submerged Lands	Land Acquisition Trust Fund, Fla. Statutes, Title 17 Ch. 253 §§253.01 et seq. (1972).	Board of Trustees, Internal Improve- ment Trust Fund	To control uses of state-owned lands.	All state-owned lands except for "spill areas", land vested in port authorities and other listed exceptions.	This act requires cer- tification by the Corps that no public land is available before ma- terial is placed on private land. Adver- tising for sale of material is required before placement on private land. All funds go to state; 1/2 pro- ceeds go to state if placed on public land & then sold. Corps created by this act be- long to state. Specific findings are required before use or sale of the islands is allowed	Yes - state is to charge for spill area use as specified in the act for any project by the Corps.	No - Corps speci- cally included as stated in (G).
(c) Sediment or Erosion Control Laws	Soil Conserva- tion Law, Fla. Statutes, Title 33, Ch. 582 (1937, as amended in 1970).	Department of Agriculture & Consumer Services, Soil & Water Conservation Council	To adopt regulations to implement this act, and to assist & help coordinate programs of local soil conservation districts.	The state agencies have no authority over any land. The districts have au- thority over land within their juris- diction.	Districts may adopt land use regulations restricting use of containment areas.	No	No mention of federal exemption.
	Beach & Shore Preservation Act, Fla. Statutes Title 11, Ch. 161 §§161.011 et seq. (1971).	Department of Natural Resources, Division of Marine Resources	To establish coastal construction setback lines, require the removal of any coastal construction or struc- ture which serves no useful purpose & is dangerous.	Authority over state-owned land below the mean high-water line of any tidal water, & authority over land up to the setback lines established by the Department.	No uses involving con- struction are allowed seaward of the setback lines except as pro- vided by specified exemptions & by waivers. A permit required for activities in other areas.	No	No - "any government agency" specifically subject to the act.
(d) Floodplain Protection Laws	No pertinent laws found under this sub-category.						
(e) Agricultural Zoning Laws	No pertinent laws found under this sub-category.						
(f) Local Zoning Enabling Laws	Fla. Planning & Zoning Enabling Act, Fla. Statutes Title 11, Ch. 163 §§163.160 et seq. (1969).	No state adminis- trative agency; the act enables local actions only.	Local governments to prepare a development plan, after which area may be divided into districts & regu- lations including zon- ing & subdivision con- trols may be adopted to control land use.	Authority over all land within local jurisdiction.	This act gives local governments the author- ity to control uses of containment areas.	No	No mention of federal activity.
(g) Port District Enabling Laws	Port Facilities Financing Law, Fla. Statutes, Title 21, Ch. 315 (1975).	No state adminis- trative agency; act enables local port authorities.	To acquire or dispose of property, to main- tain & operate such, including port facil- ities; to construct or permit to be construct- ed-islands and to fill submerged lands.	Authority over all land within local jurisdiction.	Allows local control over the use of con- tainment areas.	No	The local ports may contract with the Corps in dredging or filling activi- ties.

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(H)	(I)	(J)	(K)	(L)
Types of Uses Encouraged and/or Discouraged by the Act	Requires Permits	Specific Permit Procedure	Allows Waivers or Variances	Interaction of This Act with Other State and/or Local Authority
Use of public lands vs. private encouraged. State submerged land use, contrary to public interests; which interferes with riparian rights, impedes navigation, interferes with wildlife conservation or with oyster, clam bed or marine productivity, is restricted.	Yes, but Corps activity requires no permit; private dredging does.	No	No	Local governments have no control over state-owned lands, but the state must offer local county commissioners first right of purchase for any such land to be offered for sale.
No particular uses are encouraged or discouraged but uses which utilize proper erosion prevention measures are encouraged.	No	No	No	Local districts administer & enforce this law. The Department is the ultimate administrative authority. The Council's powers are primarily advisory.
Measures to prevent erosion, hurricane & storm damage as well as preservation of the natural condition of the area are encouraged.	Yes	No	Department may grant variance from the setback requirement if no great danger of erosion.	Local districts are permitted to enact more stringent regulations & setback lines & state waivers may not contravene the local standards. Local bodies may be asked to supervise & regulate activities of the Department.
No specific uses are directly discouraged or envisioned by the Act. Local governments are granted discretion in determining uses.	No	No	No	This act enables local governments to zone & requires planning before zoning. No state authority mentioned.
Measures related to operating port facilities are encouraged.	No	No	No	This act allows local governments control over local ports. No state authority mentioned.

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In accordance with letter from DAEN-RDC, DAEN-ASI dated 22 July 1977, Subject: Facsimile Catalog Cards for Laboratory Technical Publications, a facsimile catalog card in Library of Congress MARC format is reproduced below.

Walsh, Michael R

Productive land use of dredged material containment areas: planning and implementation considerations / [by Michael R. Walsh, Mark D. Malkasian]. Vicksburg, Miss. : U. S. Waterways Experiment Station ; Springfield, Va. : available from National Technical Information Service, 1978.

106, 8, 5 p. : ill. ; 27 cm. (Technical report - U. S. Army Engineer Waterways Experiment Station ; DS-78-20)

Prepared for Office, Chief of Engineers, U. S. Army, Washington, D. C.

References: p. 103-106.

1. Containment areas. 2. Dredged material. 3. Dredged material disposal. 4. Land use. 5. Waste disposal sites. I. Malkasian, Mark D., joint author. II. United States. Army. Corps of Engineers. III. Series: United States. Waterways Experiment Station, Vicksburg, Miss. Technical report ; DS-78-20.

TA7.W34 no.DS-78-20